

A HISTORY OF HERPETOLOGY AT THE AMERICAN MUSEUM OF NATURAL HISTORY

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FRONTISPIECE. Mary Cynthia Dickerson (1866–1923)—first American Museum herpetologist; founder and first Curator of the present Department of Herpetology. Also first Curator in the old Department of Woods and Forestry, and long-time Editor of the *American Museum Journal* and *Natural History*. Possibly taken ca. 1912 and, until recently, her only known photograph (see also fig. 4). AMNH Photographic Archives 2A-5176.

CONTENTS

Abstract	5
Introduction	7
Departmental Origin and Curatorial Staffing	8
Era of Mary Cynthia Dickerson, 1909–1920	8
Miss Dickerson’s Tragedy, 1920–1923	13
Her Legacy	17
Her “Triumvirate” (Plus One)	18
Emmett Reid Dunn	18
Karl Patterson Schmidt	19
Gladwyn Kingsley Noble	25
Charles Lewis Camp	28
Her Last Vision	31
Era of Gladwyn Kingsley Noble, 1921–1940	32
From Gossip to Legend: Noble and His Staff	39
The Pope Affair, 1935	48
Era of Charles Mitchill Bogert, 1941–1968	54
R. G. Zweifel and Successors: Second Half of the 20th Century	60
A Century of Exhibition, 1870s–1978	63
Mary Dickerson’s Habitat Groups	71
1913: The First “Reptile Hall”	79
1927: New Hall of Reptile and Amphibian Life	80
The Museum as Zoo	87
1977: Hall of the Biology of Reptiles and Amphibians	88
Exhibition Miscellanea	93
Curation and Growth of the Herpetological Collections	94
Evolution of Curatorial Procedures	95
Collecting Leaflets and Other Propaganda	104
Collection Growth and Diversity	109
Expedition Sources of the Collection	110
An Overview of American Museum Expeditionary History Relevant to Herpetology ..	116
Some Early Department Fieldwork	117
Dickerson to Arizona, 1912	117
Halter to Santo Domingo, 1915	119
Dunn to North Carolina, 1916	119
Halter and Mannhardt in Nicaragua, 1916–1917	120
Schmidt to Puerto Rico, 1919	121
The “New Technique” of Night Collecting	122
Noble in the New Jersey Pine Barrens, 1919–1922	126
The Department Infiltrates Hispaniola, 1922–1935	129
Wreck of the <i>Basilisk</i> , 1930–1931	133
Breder in Darién Jungles, 1924	134
Burden, on the Trail of Dragons, 1926	135
Bassler in the Upper Amazon, 1921–1931	139
Some Multidisciplinary Expeditions	141
Lang and Chapin in the Belgian Congo	141
Roosevelt, Miller, and Cherrie in Brazil	144
Andrews and Pope in China	146
The Whitney South Sea Expedition	150
The New Guinea Expeditions	152
Lost Worlds: The Guayanian Tepuis	154
End of an Era	160

Archival Sources and Acknowledgments	164
Appendix 1: Notes on Departmental Bibliographic Projects	166
Appendix 2: Bibliography of Mary Cynthia Dickerson (1866–1923)	169
Appendix 3: Bibliography of Gladwyn Kingsley Noble (1894–1940)	172
Appendix 4: Bibliography of Richard G. Zweifel (1926–)	181
References	187
Notes	203
Index	225

ABSTRACT

Those who use and care for collections are subtly hindered if they lack understanding of the history of their collections. The present work provides a frame of reference for the American Museum's accumulations of Recent amphibians and reptiles and for the department established to curate and use them.

The herpetological holdings began in 1869 with purchase of the collection of Maximilian, Prince of Wied-Neuwied, and additional specimens began accumulating from other sources. But the signature and scope of the collection were most importantly determined by the explosion of expeditionary fever at the American Museum in the early 20th century and by establishment of a department with curators charged with organizing and studying the incoming collections.

A Department of Ichthyology and Herpetology was formalized in 1909 and later split in 1920. The original department had three ichthyologists and one herpetologist—Mary Cynthia Dickerson, who also served as editor of the *American Museum Journal* (= *Natural History* as of 1919) and as Curator of the old Department of Woods and Forestry. Despite an incredible workload, Dickerson threw herself into both herpetological exhibition work and collection building—two parts of a calculated tripartite effort at establishing a major herpetology department that could stand on its own with the older departments of the Museum.

The third part of Dickerson's evolving program was a conscientious attempt at building a library and center for herpetological research. Frustrated in finding time for her own investigations, she deliberately sought young scholars who could independently conduct both fieldwork and collection-based research. She sent Emmett Reid Dunn on his first collecting trip and, by 1916–1917, Dickerson had attracted to her cause assistants Karl Patterson Schmidt, Gladwyn Kingsley Noble, and Charles Lewis Camp. In a few years, with interruption for military service, Dickerson's "triumvirate" was accomplishing work that would establish the department as the major research center that she had envisioned.

Concurrent with her editorship of *Natural History* and her curatorship of Woods and Forestry, Dickerson established a robust program of herpetological exhibition and research in only a decade. Herpetology—her Department—was officially separated from Ichthyology in February 1920. But Dickerson had been losing a perilous grip on her sanity and, on Christmas Eve of that year, was committed to an asylum, where she died three years later at age 57.

Assistant Curator G. K. Noble, age 27, was given formal charge of the Department beginning in 1921. Although K. P. Schmidt had resigned earlier, Noble arranged for Schmidt's return to help in a difficult transition, during which Noble completed his Ph.D. dissertation and Schmidt brought Dickerson's research to conclusion. Schmidt gave his final resignation in 1922, in order to take charge of the new Division of Reptiles and Amphibians at the Field Museum of Natural History.

Noble inherited Dickerson's departmental philosophy and continued her emphasis on exhibition and on building the collection and bibliographic files, although his own research expanded dramatically. Noble never abandoned interest in fieldwork, anatomy, and collection-based systematics, but he combined those pursuits with increasing attention to laboratory-based, experimental investigations using techniques of endocrinology and neurology. In 1928, he received offers for positions at Cornell University and at Columbia University, the latter to replace geneticist Thomas Hunt Morgan (who was later awarded a Nobel Prize for his work at Columbia). With support from President Henry Fairfield Osborn and trustee Douglas Burden, Noble's request for new facilities was approved and he stayed at the Museum. The Department was renamed the Department of Herpetology and Experimental Biology in 1928, with Experimental Biology being split off as a separate department in 1933. Although Herpetology came to suffer as a result, Noble remained Curator of both departments until his death in December 1940 at age 47.

Noble's "abrasive personality" has given rise to legends that do not stand up under examination, in particular the published claims that he was responsible for firing Assistant Curator Clifford H. Pope in 1935—the year of publication of Pope's *Reptiles of China*. Over Noble's protest, Pope was dismissed by Director Roy Chapman Andrews, who had become antipathetic to Noble's operation (ostensibly for budgetary reasons) after Osborn's departure as President.

Charles M. Bogert, hired in 1936, became "Assistant Curator (In Charge)" of the Depart-

ment of Herpetology after Noble's unexpected death in 1940. A new Director, Albert Parr, introduced the departmental title "Chairman" in 1942. Parr at that time also dissolved the Department of Vertebrate Paleontology and appointed Edwin H. Colbert as Chair of a new Department of Amphibians and Reptiles that included dinosaurs as well as pickled newts, despite George Gaylord Simpson's protest that "paleoherpetology and paleomammalogy have much more in common than either one has with its corresponding neozoological specialty." This was only one of several departmental reorganizations to which Herpetology and other departments have been subjected by administrative fiat, usually with noticeable loss of efficiency.

Another reorganization followed shortly, with Bogert installed as Chairman. James A. Oliver was hired as Assistant Curator in 1942, but, after interruption for military service, he resigned in 1948 owing to deteriorating Museum finances. With Bogert's encouragement, Oliver later returned to New York as Curator of Reptiles at the New York Zoological Society; he subsequently served as Director of the American Museum from 1959 to 1969. In replacing Parr as Director, Oliver brought a renewed commitment to systematics in the Museum.

Bogert's career (see Myers and Zweifel, 1993) needs to be understood in the larger context of the history of the Department, which owes much to his dedication and stabilizing influence at a time when Parr was de-emphasizing collections. Except for a few war-interrupted years with Assistant Curator Oliver, Bogert was the only Curator in Herpetology from 1940 to 1954. He held the collection as a reasonably well-curated unit during a long period of economic stress and severe understaffing.

Richard G. Zweifel was hired as Assistant Curator in 1954. His term of chairmanship (1968–1980) is taken as the beginning of a "modern" age in the Department, which has continued to expand its collections and improve on the quality of their care. The evolution of curatorial procedure and specimen cataloging is discussed; the catalogue data were transferred to an electronic database during 1992–1995.

One reason for establishing a new department in 1909 had to do with the Museum's expanding exhibition program. Dickerson and Noble considered exhibition work to be of equal importance to research. Dickerson developed the concept of herpetological "habitat groups" (dioramas) by skillfully employing a variety of preparation techniques—especially wax casting—to create lifelike models engaged in vital activities within complex settings. In 1927, Noble opened a "Hall of Reptile and Amphibian Life" that incorporated Dickerson's habitat groups and many other newer, less elaborate groups and mounts; he developed the technique of paraffin infiltration to use the animals themselves as exhibited models. Noble's hall celebrated diversity and focused on isolated biological themes. Bogert and Zweifel built on this rich history by conceiving a more integrated exhibit that would stress the biology of amphibians and reptiles in parallel displays, a concept that eventually resulted in the 1977 "Hall of the Biology of Reptiles and Amphibians." Newer casts could be done in plastic, the best of which, if well painted, equaled in beauty the best of the old wax models.

The herpetological exhibits and most curatorial research were made possible by Museum collecting activities. Insight is provided on early departmental fieldwork—a time when night collecting was a "new" technique made feasible by the introduction of acetylene (carbide) and electric lamps. Also discussed are some of the Museum's multidisciplinary expeditions, several of which continued for years. The Museum's great expeditionary period lasted at the outside from 1910 to 1940. Despite the Great Depression, the number of expeditions peaked not in the 1920s (about 114 starts) but in the 1930s (141 starts), owing to increasing numbers of independently financed expeditions conducted under Museum auspices.

Any revival of the Era of Great Expeditions after World War II was precluded by a complex of factors, including changing administrative and economic environments in the Museum, as well as the coming age of the airplane and automotive transport. Logistically complicated expeditions were largely replaced by field trips that could more readily be initiated by the curators. The few expeditions still being organized are nostalgic reminders of another time, when collections now irreplaceable were being gathered from around the globe.

INTRODUCTION

PROLOGUE: This will be the story told neither briefly nor completely of the creation and growth on a global scale of one natural history collection. It is a history rooted in the last years of the 19th century, with exuberant flowering in the first several decades of the 20th. Now, with the dawning of another century, most of the collectors and curators are remembered only as names on catalogue pages or in some dusty book. We pause over photographs of men and women frozen in time and ponder lives spent. We admire and envy them, and admit their failings with compassion. But there is a distance between us, and only dimly do we fathom the hardship and the jubilation of their trails. Their collections come to us from a time of islands uncharted and mountains unclimbed, when sails were set for horizons and myriad campfires gave solace during countless nights on distant frontiers. That time has gone by and some of us mourn it. But the collections passed on to our care are a treasure—a monumental library of nature—which needs still to grow but which can never be replaced in a world of sprawling cities and forgotten forests. As the wild places fade into legend, what will the new century bring,

*On the trail that thou must tread
To the threshold of our dread,
.....
Heartsick for the jungle's sake.*

The American Museum of Natural History was founded in 1869 “in the City of New York, for the purpose of establishing and maintaining in said city a Museum and Library of Natural History.”¹ The new Museum flourished and soon extended the scope of its collections and scientific investigations to all parts of the world.

Late in 1869, within months of its charter, the Museum acquired by purchase the historically important vertebrate collections of Alexander Philipp Maximilian, Prince of Wied-Neuwied, the great explorer of coastal Brazil and of the Missouri River. As reported in the new Museum’s first annual report, in January 1870,

The collection consists of 4,000 mounted birds, 600 mounted mammals, and about 2,000 fishes and reptiles [and amphibians] mounted and in alcohol. It is regarded as one of the most important private collections in Europe, and has long been consulted by the scientific world, and contains a large number of *types*, the results of the Prince’s explorations in South America, and many rare specimens which have been secured at intervals during the period of a long lifetime.

Additional collections of amphibians and reptiles were soon accumulating from various sources, of which 20th-century Museum expeditions were eventually to become most

important. The herpetological specimens were first held in the care of a Curator of Zoology. Later, for reasons now obscure but perhaps related to alcohol storage, they became housed in the Department of Invertebrate Zoology, where they were cared for by William Morton Wheeler² from 1903 through 1908.

Although a few bottled and dry-mounted reptiles probably were exhibited starting in the 1870s, serious exhibition work and support of publications did not begin until the early 1900s. By about 1905, exhibits of reptiles and amphibians found in the vicinity of New York City had been installed in conjunction with two guide leaflets written by Raymond Lee Ditmars, Curator of Reptiles at the Bronx Zoo, and published by the Museum (Ditmars, 1905a, 1905b).³ In 1906, the Department of Invertebrate Zoology sponsored an expedition to New Mexico and Arizona by Alexander G. Ruthven⁴ of the University of Michigan, and the Museum published the herpetological results a year later (Ruthven, 1907).

The time for the Museum to establish its own herpetology program was imminent. It was to start with Mary Cynthia Dickerson, an author and teacher of independent spirit.⁵

DEPARTMENTAL ORIGIN AND CURATORIAL STAFFING

ERA OF MARY CYNTHIA DICKERSON, 1909–1920

From the beginning she realized that a department without a collection was not worthy of the name.
(Noble, 1923n: 516)

Miss Dickerson, as she was always respectfully addressed by her colleagues, was 42 years old when she commenced work at the American Museum on November 1, 1908.⁶ She started not as a herpetologist but as Assistant in the old Department of Woods and Forestry. One of her first accomplishments was the preparation of a 104-page guide to the forestry hall (Dickerson, 1910a). That this was an admirably competent survey was not surprising, since Dickerson had already demonstrated herself to be a gifted naturalist and writer through publication of two well-received books that were lavishly illustrated with her own photographs, *Moths and Butterflies* (1901) and *The Frog Book* (1906), and she had called further attention to herself at the Museum by donating 460 specimens of frogs in 1905,⁷ which were said to represent all but one of the species then known from the United States (Osborn, 1911: 65). Then she had written “The Pageant of Nature,” a charming account of seasonal change in the woods and beaches of Rhode Island and southeastern Massachusetts. This piece of nature “reporting” and photography had been commissioned by *Country Life in America*, which serialized it the year before she came to the Museum (Dickerson, 1907).

It is uncertain from available records whether a role outside the Department of Woods and Forestry was originally envisioned for Dickerson, but she had been at the Museum only eight months when a Department of Ichthyology and Herpetology was organized in July 1909,⁸ including Recent and fossil fishes and Recent amphibians and reptiles. Dickerson, the only herpetologist in a curatorial staff of four, became “Assistant on living reptiles and batrachians.” Her new ichthyological colleagues were the eminent Bashford Dean, Curator (a title then including the equivalency of today’s Chairman), Louis Hussakof, and 26-year-old John Treadwell Nichols, who would later (in 1913)

launch the journal *Copeia* from his Museum office. The terms of Dickerson’s split assignment were confirmed by Director Bumpus on July 29, 1909:

In pursuance of our conference of to-day, I would say that for the present it is arranged that your hours at the Museum will be from nine to twelve and from one to five—nominally seven hours a day, of which you will devote your mornings to the Forestry Department and to such other work as you and I may agree upon, and your afternoons to Dr. Dean’s department. Your salary is to be \$125 per month.⁹

Several months later, Dickerson also took on editorial responsibilities. Her promotion to an assistant curatorship in Ichthyology and Herpetology and to the curatorship of Woods and Forestry came two years later.¹⁰

Dickerson was thus to distinguish herself for dedication and hard work at the Museum by holding *two* concurrent curatorial positions *and* an editorship. She became Associate Editor (November 1909–June 1910) and then Editor (1910–1920) of *The American Museum Journal*, the name of which was changed to *Natural History* during her editorship.¹¹

Throughout her tenure, Dickerson promoted the growth of the herpetological collections and involved herself in developing habitat groups devoted to the exhibition of amphibian and reptile life, as well as continuing her parallel work in Woods and Forestry and her editorship. She apparently defined the establishment of a Herpetology center as her greatest challenge and was not content simply to function as an assistant to an ichthyologist, no matter how distinguished and accomplished he might be. Existing correspondence¹² between Dickerson and Curator Dean hints at some of the difficulties, revealing Miss Dickerson as determined and Professor Dean as somewhat baffled but always a model of politeness.

Bashford Dean (figs. 1, 2) felt at the beginning that he was in charge of all curatorial matters involving the collections under his charge, but Dickerson felt, and indeed *knew*, that herpetological specimens should not be curated like fishes. She also felt the need to proceed deliberately, and she repeatedly asked Dean to stop soliciting exchanges of



Fig. 1. Bashford Dean (1867–1928), first Curator (Head) of the American Museum's old Department of Ichthyology and Herpetology, and also concurrently Curator of Arms and Armor at the Metropolitan Museum of Art. Photograph from ca. 1918. AMNH Photographic Archives 312546.

herpetological material. She expanded on her view in a letter dated April 3, 1911:

And pardon me if I repeat facts regarding a policy for exchanges. The collection must be made strong in American material, especially in local material prepared according to late methods, so that honor will be attached to exchanges representative of the work of the Museum. This Museum has either a very bad reputation or none at all in regard to its herpetology collection and it would seem wise that for the immediate present at any rate, it adopt a policy of not inviting exchanges. As I said in my note of March fourth, "The department will advance on much more secure grounds and in the end will develop a better study collection for itself and a better reputation among outside institutions if this work is progressed in slowly." The National Museum has recently set the precedent; it did not give exchanges in herpetol-



Fig. 2. Another view of Bashford Dean, who planned and installed a collection of armor at the Metropolitan Museum of Art (the Met's collection of arms and armor was founded partly on Dean's private collection). During World War I, Major Dean served (1917–1918) in the U.S. Ordnance Service and was engaged in developing improved helmets and other special body armor. He also was a specialist on armored fish. Undated photograph, copied from Gregory (1930: pl. 5).

ogy for at least a year during the work of recataloguing incident to removal to the new building.

Meanwhile, Dean had been annoyed that Dickerson's several positions gave her easy access to the Director, which she did not hesitate to use to her advantage. She was, in effect, a maverick in his department and he tried to clarify his concerns in a 4-page letter on March 7, 1911 (emphasis his):

. . . lest any question come up as to just what each of us expects in the line of our respective activities,

I would be very glad to jot down my conception of the duty of a curator to his assistant curators: He should first ascertain that *all are willing to pull together and in the same direction*. He should know what each is doing and be privileged always to talk over plans big and little. He should make it clear that it is the department, not the individual, which claims the right, title and interest of all. He is to see to it that plans are such as to gain the sympathetic support of his staff at staff meetings, before they are referred to the Director . . .

It seems to me that the head of a department is the one to whom the Director can hold personally responsible for every plan and every expense. If this is true, it is clear that the curator needs the indulgence of his colleagues in having to ask them to transmit all requisitions for his signature, in asking to visé all correspondence which invites exchanges and purchases, and in requiring all official business with the Director to go through his hands.

This is my general understanding of the curator's liability. It may interest you to revise it, and I shall be very glad if you will talk it over with me? If then we find any differences, let us at once arbitrate, so that we can make a capital start . . . I have somehow the feeling that if a concrete understanding of this kind had been arranged at the beginning of my curatorship two years ago, my path would have been smoother. You may recall that in those days certain of your plans were discussed by you with the Director (instead of through me) for the details of which I believe I was afterward held accountable. So it goes without saying that I am anxious to fix the responsibility upon myself as far as possible.

Well, Dickerson also was anxious—to fix responsibility for all herpetological matters on herself—and this kind of give and take continued over the years before Dean graciously was to recommend separate departmental status for Herpetology. But Dickerson somehow had to acquire her own staff. Her success in so doing would be the key to it all.

On April 3, 1911, a few weeks following Dean's polite remonstrance quoted above, Dickerson temporarily acquiesced to his request that she follow departmental protocol. She wrote to him that

I wish to make the request that I be granted a full-time assistant, some college young man trained in accurate scientific study, to assist me on the herpetology collection. Naturally as a herpetologist, research is my especial interest and this collection with the scientific work it entails is my most valuable asset as Assistant Curator of Herpetology. I am hoping that this assistance can be made possible very soon, as now that the Journal is off for four months I shall be able to concentrate attention on this work.

She probably had a specific "college young man" in mind. Dean, however, declined this

request, saying that the department had "already been treated with great generosity in the matter of helpers—you perhaps more than anyone else." He probably was referring to the fact that Dickerson had already gotten a personal assistant through her earlier intervention with the administration.

In August 1910, nearly two years after her hiring, Dickerson had appealed directly to the Acting Director for assistance:

I write to recommend the appointment of an assistant in the work under my charge, namely, forestry, herpetology and the American Museum Journal. It chances that more has fallen to my share than I can carry on without assistance and bring about the high results in both quality and quantity which it would be my desire to give the Museum. In fact, I feel the need so great that I should be willing, if necessary, to sacrifice temporarily a part of my salary to help pay such an assistant—for which help the amount of work done could be nearly doubled.¹³

The person that she was recommending for the job was Stella Risley Clemence (fig. 3), "a young woman of considerable ability" (who later became a scholar in her own right).¹⁴ Miss Clemence was hired late in 1910, but it is not clear how much of her work involved editorial matters or Woods and Forestry. However, before her departure in 1915, she seemed to be spending most of her time in Herpetology and was credited by Dickerson as being largely responsible for "her two years of painstaking labor in getting [the study collection] into ready reference condition." Clemence also collected for the department on at least one occasion.¹⁵

Dickerson's second assistant was Arline Field,¹⁶ who overlapped for one year with Clemence and who also seems to have spent most of her time in Herpetology. In the words of Dickerson, Field became "keeper of the collection" after Clemence. These two young women were important in bringing order to the early collection and in helping Dickerson extend the range of work that could be done.

Dickerson's third assistant was Clarence Robert Halter,¹⁷ who was 22 years of age when he wrote about a possible job in the spring of 1914; he appears to have been a reptile enthusiast, since one of his references was Raymond L. Ditmars. Dickerson's main use of Halter was to get him into the field,



Fig. 3. Stella Risley Clemence (1882–1966), first Assistant to Mary C. Dickerson. Miss Clemence performed important work especially in organizing the herpetological collections during 1913–1915. She eventually became a Hispanic manuscript specialist in the Library of Congress, where she was one of the world's leading authorities on early Spanish manuscripts concerning the colonization of Mexico and Peru (see Clemence, 1932, 1936). This photograph probably was taken in 1910, when she graduated from Pembroke College (Brown University). AMNH Dept. Herpetology Archives.

at first to the Dominican Republic and then to Nicaragua (see under *Some Early Department Fieldwork*).

In 1916 and 1917, Dickerson attracted outstanding assistants by the names of Schmidt, Noble, and Camp. As discussed later, these young men became her "triumvirate" and helped to crystalize her plans for her "Department" of Herpetology. She had gotten the exhibition program off to a good start (see under *A Century of Exhibition*) and, with added help, could start concentrating on collection building and research, with fieldwork being an integral part of both activities.

After joining the Museum, Dickerson conducted a few short field trips to Massachusetts and Florida for photography and for gathering materials for herpetological habitat groups, and she also collected with scientific objectives in Arizona in August 1912. Otherwise she personally found little time for fieldwork. Sojourns to the countryside, a source of inspiration for her earlier books and photography, essentially seem to have ended after she moved to New York. One of her new roles at the Museum was that of collection builder. She was eager for well-preserved specimens and appreciative of large series and ancillary data. For example, concerning 4800 specimens newly arrived from the 1909–1915 Congo Expedition, Dickerson noted:

These Congo specimens are extremely well preserved. In fact they are in a condition remarkable for a local collection, and when we recall that the material was collected under the difficulties of climate and travel in tropical Africa, and was kept in the tropics five or more years before shipment to America, its condition is truly phenomenal. The collection is particularly valuable scientifically, in having a large number of representatives of a species from each area collected over, so that complete series are on hand with notes on habitat, color, breeding habits, etc., for comparative study.¹⁸

Dickerson, however, was not content to wait on the results of the large Museum expeditions—she saw to it that Herpetology sent its own collectors afield, as is discussed later (under *Some Early Department Fieldwork*). She also encouraged donations, purchased specimens, and conducted exchanges with institutions around the world. Dickerson was not trying to accumulate specimens so energetically without purpose. Her rationale for

collection building was imparted to her assistants and clearly enunciated in the annual report for 1919, recognizing that

rapid building up of the collections is of vital importance, because all research—taxonomic, distributional, or morphological, as well as all exhibition, is based on the collections. The department, being still considerably under ten years of age, differs from the other departments of the institution, many of which are a half century old, in having relatively meager and inadequate reference material. Attention must be centered on building up this material for several years before the department will be in a position to do its most efficient and authoritative work.¹⁹

Owing partly to Dickerson's sense of purpose (her stubbornness if you will) and partly to Dean's preoccupation with other matters, Herpetology and Ichthyology started to function as fairly separate entities under Dean's benevolent leadership. Bashford Dean successively held the titles Curator of Fishes and Reptiles (1909–1912), Curator Emeritus (1913–1916), and Honorary Curator (1917–1928). Perhaps to Dickerson's relief, Dean withdrew from most department activity about 1913 because of his extensive travel and duties as Curator of Arms and Armor at the American Museum's sister institution across Central Park, the Metropolitan Museum of Art (see Gregory, 1928, 1930; Osborn, 1929). But even with the title changes, Dean remained the senior administrator in the Department of Ichthyology and Herpetology, in which curatorial titles of other staff were tied explicitly either to Ichthyology or to Herpetology.

By 1919, after a decade of coexistence, Dean recognized that the time was propitious to consider formalizing the separate activities of the department, in which great strides had been made on both sides. As later observed by Noble (1923n: 516):

Miss Dickerson perhaps displayed her greatest genius . . . in organizing the department of herpetology . . . As a result, in ten years the American Museum collection has increased from one of the smallest to the fourth largest museum collection in the United States, and now includes nearly 50,000 specimens.

Thus, on the basis of that accomplishment—indeed, that "genius," considering the circumstances—Bashford Dean wrote on Metropolitan Museum letterhead late in 1919:

My dear Miss Dickerson:

I am sending you an extract from a letter to Professor Osborn, which will at least show you how much I appreciate the important work which has been done on the side of the reptilia in the museum, and I hope that the time will soon come when a new department will be created.²⁰

The aforesaid extract, a carbon copy of the second page of Dean's letter to President Osborn, follows:

In the matter of the work in the reptilia, I do not know whether the moment has come when the Museum can arrange a new department? My own connection with this work has for a number of years been nominal. And in view of the fact that such excellent progress has been made in developing this phase of the Museum's activity by Miss Dickerson and her associates, it seems only fair that she be made the head of a new department. At all events, when the change can be made, may I recommend it to your favorable notice.

Bashford Dean's advice was acted on promptly, and on February 2, 1920, a new Department of Herpetology was formally created, with Mary Cynthia Dickerson as its first Curator.²¹ Dickerson therefore is the founder of the first separate Department of Herpetology, which was brought about by her vision, hard work, and astute administration. But her tenure in the new department was tragically brief, lasting less than a year.

MISS DICKERSON'S TRAGEDY, 1920–1923

The catalogued data of a human life are brief and quickly told: the living of them is slow, complex, and puzzling. (By her friend, Maud Slye, 1923: 509)

Dickerson had for several years been subject to increasing mental disturbance that she herself had come to recognize by early 1919:

My own overwork, in several lines, with assistants away in war service, besides the deterring influence of a troubled mind, has deferred my research . . .²²

She clearly *was* overworked, having carried the responsibilities of three positions simultaneously for most of her tenure at the Museum, where she held the editorship of *Natural History* and curatorships in Herpetology and in Woods and Forestry.²³ While all that work was being carried on, Dickerson's increasingly "troubled mind" eventually was to include hallucinations about a Museum acquaintance, the Arctic explorer and author

Vilhjálmur Stefánsson. He had led the American Museum's Stefánsson-Anderson Arctic Expedition in 1908–1913 (Stefánsson, 1913, 1914) and, on a subsequent expedition for the Canadian government, had disappeared for a year and a half (April 1914–September 1915) in a vast unexplored part of the northern polar region. Stefánsson returned to the Museum in late 1918 and received letters from Dickerson that are, even to a layperson, indicative of mental disturbance.²⁴

President Osborn had had a conference with Dickerson in February 1920, probably in reference to the direction of the new Department of Herpetology that was established that month. Dickerson evidently indicated a desire to divest herself of *Natural History* in order to concentrate on her scientific and exhibition work. Referring to that conference, she offered her formal resignation as Editor on June 5, 1920.²⁵ Responding on June 9, President Osborn did not accept her resignation, but he clearly recognized that she was under some sort of pressure and thought that a vacation was in order:

I feel very strongly two things: first, that you should be given a thorough change and a holiday from your prolonged and arduous labors in the Department and for the Journal [i.e., *Natural History*]. Second, that it is impossible at the present time to replace you as editor of the Journal. It would be a calamity to see this splendid structure which you have erected come to a sudden stop, and there is literally no one at this moment to take your place.

I know that the Trustees will be very glad to vote you leave of absence with pay and perhaps with a special allowance—a real holiday which you need and which you deserve. I have in mind a plan to take care of the May–June number, of the July–August number, and of the September–October number, by devoting these numbers to special exhibits or departments.²⁶

Dickerson agreed to do her best with the "*Journal*" (everyone was having trouble getting used to "*Natural History*," its new name) but said she did not want a vacation ("I wish to work"). Osborn, however, was concerned and insisted that she take a few months off, saying that he had charged Director Lucas and Executive Secretary Sherwood to arrange for her to be relieved of two numbers of the journal in her absence.²⁷

By November 1920, scarcely half a year after establishment of her new Department, Dickerson's behavior appears to have be-



Fig. 4. The second known authenticated photograph of Mary Cynthia Dickerson. This picture clearly was taken during the same setting as the well-known portrait used in the frontispiece. Possibly taken ca. 1912, when she was in her mid-40s (see note 5 for dating). AMNH Dept. Herpetology Archives, courtesy of Mrs. Margaret D. Hopkins, Dickerson's niece.

come alarmingly erratic and of serious concern. On November 4, President Osborn reluctantly sent a 2-page letter accepting her resignation as Editor, saying that

I am extremely desirous that you should be free to devote yourself to your own department and your own researches, which have suffered so seriously through the overburden that the journal has placed on your shoulders. I look forward to a beautiful reptile hall in the new southeast wing and think that all your time and energy should be devoted to planning this hall and the collections it will contain so as to make it the best hall of reptiles in the world.²⁸

She remained stubborn, even after Director Lucas pleaded with her on November 15:

Please take a vacation for me—President Osborn began last summer to make me “insist on Miss Dickerson’s taking a vacation,” but it is sometimes difficult to carry out instructions.²⁹

Osborn was being forced to more drastic action, and matters reached the crisis point on November 19, 1920, when Osborn and Dickerson exchanged letters. Osborn wrote:

I regret very much to learn that you have not taken advantage of the arrangements made by Director Lucas . . . I feel so strongly that you must have a complete change immediately, both in your own interest and in the best interests of the Museum, that I am led to suspend your work as Curator of Herpetology and direct you immediately to enter upon a vacation period . . .

I trust you will accept this letter with a renewed expression of my appreciation of the work you have accomplished and the utmost desire that a period of rest and change can restore you to health and relieve you of your present anxiety . . .

Dickerson responded the same day, both to Osborn’s letter and to its verbal repetition from Assistant Secretary [later Director] Sherwood:

I have received verbally your communication through Mr. Sherwood. I can only respond that I am not in need of a vacation and for personal reasons I shall not discontinue my work. I have not therefore—although most humble and recognizing my own lack of worthiness for the honor of my position in the Museum—accepted your letter or honorarium. I await a personal interview with you as president of the Board of Trustees relative to possible changes of personnel in the staff of assistants under my charge.³⁰

As of then, November 19, 1920, nothing was ever to be the same again. That same day, the Museum’s Medical Examiner and later the police were called in and she was forcibly removed for observation. The following

firsthand account was provided by Dr. George M. Mackenzie, the Medical Examiner:

My dear Professor Osborn:

Although you have probably heard from Mr. Sherwood the developments and final outcome of the problem presented by Miss Dickerson, I thought you might like to hear from me directly concerning my part in the unfortunate affair.

After my conference with you, Mr. Sherwood gave me the details of the matter up to that time. I then saw Miss Dickerson and spent perhaps an hour with her. She talked quite freely and, even to me, though I am not experienced in psychiatry, it was quite evident that she was suffering from a well developed mental disorder and, furthermore, that she was at that time a grave danger. She had systematized delusions centering about the Stephansson [Stefánsson] affair, and as you know, had made definite threats against her associates at the Museum.

With that conclusion, the problem then was to accomplish her commitment with as little disturbance for her as possible. I was totally unable to persuade her to go to her brother, and I doubt very much if anyone could have done so in the frame of mind she was in.

In an effort to get expert advice, I tried to reach Dr. Tilney, but he was engaged and could not take up the matter. I then got into communication with Dr. Foster Kennedy, and told him over the phone the facts in the case and asked him if he could come to the Museum, and when he said that it was impossible for him to do so at that time, I asked him what his advice would be. It was his opinion that without her cooperation, forcible commitment was the only course that could be pursued. The details of what happened when our decision to commit Miss Dickerson forcibly was carried out, I have no doubt have been told you by Mr. Sherwood, who was present. With the arrival of Miss Dickerson in the Psychiatric Ward at Bellevue, Dr. Kennedy took over the problem of the management of her case. I kept in touch with Dr. Kennedy over the phone and had one conference with him and agreed with all his decisions in the matter. He also had the advice of several eminent psychiatrists. Among them was not a dissenting opinion so far as I have heard as to the nature of her condition and as to the proper disposition to be made.

The outcome of it was unfortunate, I believe, but without voluntary commitment and without the consent of the brother to involuntary commitment, nothing else could be done. The arrest and forcible commitment in Bellevue at first thought may have seemed unnecessarily harsh management of the problem, but the more I have had the opinion of others who are accustomed to handling such cases, the more I am convinced that there was no alternative.

I trust that the matter is ended and that the brother, who has assumed the responsibility of Miss Dickerson will not have the difficult time that one would anticipate for him from experience with similar cases.³¹

She was paroled into the custody of her brother Frank, who came to New York and took his sister to his home in Cleveland, but Dr. Mackenzie's apprehensions proved prophetic. On December 8, two days after the above letter, Frank Dickerson sent the following wire to Assistant Secretary Sherwood:

Sister left this afternoon. Think for New York. Could not stop or accompany her. She left without my seeing her. She has turned against me.³²

Dickerson appeared at the Museum on December 10, evidently in a deranged state. The press reported that she

was sent to Bellevue Hospital for observation last night on complaint of an attendant of the museum. The attendant reported to the police of the West Sixty-eighth Street Station that the woman's actions in the museum were peculiar. Dr. Foster Kennedy of 20 West Fiftieth Street advised that the woman be sent to Bellevue.³³

On Christmas Eve, of 1920, Mary Dickerson was institutionalized in a state psychiatric hospital on Ward's Island. Six months later, the hospital's superintendent provided the following assessment in response to a query from a Manhattan physician apparently acting on behalf of the Museum:

The patient came to us on the 24th of last December with a history of delusions and persecutions extending over a period of about seven years. She is about fifty-three years of age and is a woman of culture and education. She was employed at the Museum of Natural History . . . While at the Museum she manifested mental abnormalities, and showed an attachment for a prominent Arctic explorer. She had hallucinations of sound, imagining the explorer was talking to her while he was perhaps thousands of miles away. She developed ideas of reference, spoke of certain signs made by other people which she interpreted as referring to herself.

Since being with us the patient has been quiet, but very suspicious, refers to constant surveillance, and still has prominent ideas of reference. She is in good physical health, although rather poorly nourished; holds herself aloof from the other patients, complains of her detention, but is really more satisfied than one would expect considering the delusions from which she suffers.

When pressed for a prognosis of her case, the Superintendent added a few days later that

From the history we obtained, Miss Dickerson has been laboring under delusions for about seven years, and during her residence here has not corrected these

at all, and in fact has enlarged upon them and now involves those with whom she is associated on the ward.

Our diagnosis in her case is Paranoic condition, and I hardly think recovery can be expected . . . She may eventually make a certain amount of readjustment but I doubt, from the character of her delusions, if she will ever be able to get along without supervision.³⁴

Her health deteriorated. Karl P. Schmidt observed in August 1921, that

Miss Dickerson has certainly failed greatly in physical strength since she went to Ward's Island, and I think a difference for the worse is noticeable since June, when I first saw her there. My first visit seemed to cheer her, the recent one depressed her.³⁵

Attempts by friends, colleagues,³⁶ and museum officials to have her transferred to more cheerful and private surroundings came to nothing. The main attempt was to get her transferred to Bloomingdale Hospital in White Plains, New York, a state-of-the-art psychiatric facility from which the word "Asylum" had been removed in 1894 (see Russell, 1945: 343–344). Bloomingdale was thought the best choice but apparently had a policy of accepting only new patients judged curable. (Some of the "older patients whose outlook for further benefit was unfavorable" were in fact discharged to make room for incoming patients [Russell, 1945: 398].) This was especially unfortunate because, in November 1920, only a week after Dickerson's first removal from the Museum, President Osborn personally wrote a letter that could *at that time* probably have gained her admittance to that somewhat upscale institution:

My dear Doctor Lambert:

I am deeply interested in the case of our brilliant Curator and Editor of "*Natural History*," Miss Mary C. Dickerson, who has broken down partly from overwork. I trust a place may be found for her immediately in Bloomingdale Asylum and that under the very expert psychiatric advice . . . she may recover . . .

I know Mr. Frank K. Sturgis very well personally and he has a high regard for Miss Dickerson's work . . . I know that I can count on his personal interest. Mr. Sherwood is kindly representing me in this matter.³⁷

But as Sherwood later explained to one of Dickerson's friends, a sense of personal pride caused her to refuse "to consent to go to Bloomingdale or anywhere else that would involve expense for others." She would not

accept "any assistance which even remotely suggests charity,"³⁸ and at first isolated herself from friends who tried to see her at the state institution where she ended up. As noted by Sherwood,

Several of her friends have tried to call on her at Wards Island but she refuses to see them. Fruit and other delicacies sent in she has refused to eat herself, but has distributed them to the other inmates. The doctors at the hospital were willing to assign her to a private room. This she refused, stating that what was good enough for the rest was good enough for her.³⁹

In April 1922, however, President Osborn again tried to bring about her removal to Bloomingdale, telling Sherwood that "There is no hope at all for the poor woman where she is . . ."⁴⁰ Receiving word that Dickerson would now consent to be moved, Osborn again attempted to use his influence with his friend Frank K. Sturgis, who was Vice President of the New York Zoological Society and also Chairman of the Bloomingdale Committee of the Board of Governors; Sturgis had recently donated funds to Bloomingdale for "an attractive and commodious occupational therapy building for women" (fide Russell, 1945: 396). Osborn told Sturgis that Dickerson's "mental breakdown was a serious loss not only to the Museum but to education and to science at large," and asked him to "take up the situation with the Superintendent at Bloomingdale."⁴¹ Sturgis looked into it but had to respond negatively, as acknowledged by Osborn on May 3, 1922:

. . . I appreciate all the steps you have taken and naturally, with you, must yield to the judgment of the physicians. At the same time, I am deeply grieved because I know that this decision is equivalent to signing her death warrant.

From personal reports I have had from Doctor and Mrs. Noble, two of our very attractive young curators, also from Mrs. John I. Northrop, a very experienced person and President of the School Nature League [see Crosby, 1920; Northrop, 1920], who have personally visited Miss Dickerson a number of times, I had hopes that this transfer would be possible. They all report that in the present environment . . . there is no hope of recovery.⁴²

The sadness and poignancy of the last few years of her life were best recorded by G. K. Noble, in a letter written to Sherwood in January 1922:

Mrs. Noble and I visited Miss Dickerson at the

Wards Island Hospital on Saturday, January 14. We found her pitifully aware of her condition. The details of her former life seem perfectly clear to her. She recalled numerous incidents of departmental interest. Physically she is in very poor health, having lost more than thirty pounds. She spoke most despairingly of "how long her sick mind and body could stand this."

Miss Dickerson's independent and retiring nature protests continuously against her present surroundings which allow her little if any privacy. She spoke of wishing to work on the new guide to the forestry hall but, after some reflection, almost wept as she explained how impossible it would be to do this work where she is now situated.

In brief, Miss Dickerson does not seem as bewildered as when she left the Museum. Physically she is very run down, and holds little hope for the future.⁴³

Mary Cynthia Dickerson was 57 years old when she died in despair on April 8, 1923.⁴⁴ Memorial articles extolling her several fields of endeavor were published in the September–October 1923 issue of *Natural History*.⁴⁵ A fictionalized account of her breakdown was published in 1966 by author and screenwriter Alvah Bessie, who never knew her.⁴⁶

HER LEGACY

*What shall I do to be for ever known,
And make the age to come my own?*

(Abraham Cowley, 1618–1667)

Tragedy clings leechlike to memory, but it would be regretful, odiously so, if Mary Dickerson came to be remembered only as the museum lady who went insane. She established the magazine *Natural History* that still survives, she advanced the cause of forestry education through exhibition and writing, she pioneered new exhibition techniques, and, were that not enough, she established concurrently a major natural history collection and a major center for systematic research.

Dickerson clearly knew what research was and had the urge but not the time to do it, so her own systematic contributions were few and modest (appendix 1). She wrote well under her own name or under the cloak of editorial anonymity, but she was a loner, having coauthored only three papers (as junior author with David Starr Jordan, in 1908). Although she could easily have appended her name as coauthor to the papers that she assigned to assistants, it was not in her nature.

Noble (1923n: 516) suggested that Dick-



Fig. 5. Three of the young men encouraged by Mary Dickerson who went on to become leading herpetologists of the 20th century. *From left to right:* Emmett Reid Dunn (1894–1956), Charles Lewis Camp (1893–1975), and Gladwyn Kingsley Noble (1894–1940). Photograph taken at the American Museum, probably in Noble's office about 1920–1921 (see note 67 regarding date). AMNH Dept. Herpetology Archives.

erson's "greatest genius" was "in organizing the department of herpetology," which also has to be taken to mean her staffing of that department. As nearly as I can tell, she visualized Herpetology as a separate department from the outset and threw herself into exhibition and curatorial activities to make it so. But she also found promising talent, encouraged fieldwork, and nurtured independent scholarship.

Dickerson was keenly perceptive in finding gifted assistants. She established the American Museum as an influential force in herpetological research most conspicuously through the hiring and encouragement of three young men whom she and they regarded as the department's "triumvirate"—Schmidt, Noble, and Camp (figs. 5–7). And there was E. R. Dunn (fig. 5), to whom she provided early opportunity and wished to have hired. With Dunn included, they had, in the words of Schmidt, a "quadrumvirate."⁴⁷

Dickerson and her young flock had an ex-

hilarating several years from about 1916 into 1920—a time interrupted by the rumbling of war in Europe and ending with her devastating illness.

MISS DICKERSON'S "TRIUMVIRATE" (PLUS ONE)

I have become very enthusiastic about the possible future of herpetology in this museum and in the country at large . . . The kind of work that you [Camp] and Noble and Schmidt have done is about to make a place for itself. Miss Dickerson believes that there would be plenty of room both now and in the future for you three men in the museum as the field is so vast. (William King Gregory, letter to Charles L. Camp, May 12, 1919)

EMMETT REID DUNN

"Miss Dickerson sent me on my first collecting trip" (Dunn, 1926: 57). E. R. Dunn (1894–1956) was the first (by several months) of the four young enthusiasts in whom Dickerson saw special promise and sought to enlist to her cause. She had uncom-

mon luck or uncanny prescience, for those four now rank among the most influential herpetologists to have worked and died in the 20th century (e.g., see Adler, 1989).

Dunn himself first wrote to Dickerson on January 16, 1916, asking for the loan of salamanders of the genus *Desmognathus* for use in revisionary studies. Dickerson started the loan process with encouraging words ("It [*Desmognathus*] is one of the many spots in North American herpetology where careful intensive work needs to be done."). A few months later (March 18, 1916), Dunn wrote again,

to ask if there is any chance of a summer job for me collecting amphibians and reptiles, and possibly mammals in the Carolina mountains . . . I am deeply interested in salamanders and would like to collect in North Carolina on my own account, but financial reasons prevent. Now if I could collect there for the American Museum, there would be a chance for me to work up the collections and have the added advantage of a field experience . . . Of course I don't know whether this sort of thing is done . . .

This tale is continued later in this history (under Some Early Department Fieldwork). Suffice it to say here that the response was positive and that Dunn came to New York on June 26, 1916, to meet Dickerson—a day remembered four decades later by K. P. Schmidt (1957: 75):

The patroness of the first of Emmett Dunn's expeditions, to the North Carolina mountains, was Mary Cynthia Dickerson. I chanced to make my own first visit to the American Museum on the June day in 1916 when plans for that expedition were being discussed, and Miss Dickerson took us to lunch together in the old Mitla Restaurant [see Anon., 1910]. The congenial contact established [with Dunn] on that day was to become a forty-year friendship . . .

Dickerson twice discerned talent on that day. In the case of Dunn, later that summer (August 30, 1916) she sent

a confidential note to ask if there would be any possibility of your getting out of your Smith College position for the ensuing year to come to the American Museum as assistant in herpetology to work in research on collections . . . What would be the lowest salary that you would consider?

Although "pleased and flattered," Dunn felt that it was impossible to withdraw from a position that he had accepted the previous spring. But Dickerson kept the door open in

case in "perhaps a few months or a year later you will find it possible to come to the American Museum." In the following year, after Dunn had been called up for military service, Dickerson expressed "disappointment that you are not able to work for me this summer" (July 9, 1917).

Late in 1918, before being released from the Navy, Dunn wrote two letters hinting at the possibility of his being available either for Museum work or for collecting in Mississippi. Dickerson wrote on December 6, 1918:

Your note of November 23 was surprisingly uncertain following your previous letter. I have asked for the appropriation for salary for six months. This is likely to be granted and might lead to something that would interest us both . . . Whether it be in research for publication or in field work I should be glad to have you help me out in the herpetology department until you go to Harvard, if possible.

In her last letter to Dunn, responding to his loan request for more salamanders, Dickerson regretfully mentioned that

Our interest always is in results in herpetology—only, of course, I should have been glad if it had proved possible for you to do some work at the American Museum.

Although never salaried by the Museum (the North Carolina work was for expenses only), Dunn was to serve the Department again in 1926, on Noble's recommendation, as Zoologist to Douglas Burden's Dutch East Indies Expedition (see Burden, on the Trail of Dragons, under Some Early Department Fieldwork), and he was a Research Associate in the Department of Herpetology at the time of his death in 1956 (see Adler [1989: 92–93] for a biographical sketch and other references).

KARL PATTERSON SCHMIDT

Miss Dickerson was friendly and sympathetic and set me firmly on the course that led to my museum career . . . It was at her insistence that I took my bachelor's degree [in 1917] from Cornell, which had lapsed on account of the expedition to Santo Domingo. (from Schmidt's unpublished autobiography, 1949)

K. P. Schmidt (1890–1957) was pulled from an academic environment in 1907, during his freshman year at Lake Forest College, near Chicago, to help establish a pioneer

family farm in Wisconsin—a farm that was to remain a focal point in his life for many years (and where his mother and favorite younger brother Frank were later to die in a fire). Thoughts of college were not abandoned, and Schmidt took correspondence courses through the University of Chicago (not the University of California as stated by Mayr, 1990). After six years on the farm, Schmidt was enticed to Cornell University by Prof. James G. Needham, a family friend and former teacher at Lake Forest College. On February 14, 1913, Needham offered an undergraduate assistantship (with remission of fees and a stipend of \$200 for one term) in Needham's course, the "Natural History of the Farm." Karl had well prepared himself for such an opportunity, as revealed in a letter handwritten to Needham on April 28, 1913:

The work on the farm has been hard—some of it too hard; the winter work in the woods with below zero temperature is a terrible drain on the energy of a person not thoroughly hardened to it; and making hay by hand, blasting & picking up stumps and rocks, is not easy work. The regular farm work I like well enough, but I have had mostly clearing & work in the woods; and am glad to get away from it. I have read a good deal of agricultural literature, bulletins, magazines etc, and I think I could probably run a dairy farm without much more training.

My biological work since leaving college has been "nature study"—a little of everything. We know almost every flowering plant, nearly all the birds, all of the trees, and a few of the insects that we have on the farm. Some of this has become second nature to me—I distinguish the trees perfectly in winter, but I would have difficulty in telling how I do it . . .

My brother Frank takes to nature study . . . We have wild flowers by the million in our hundred acres of woods . . . Frank has been invaluable in a little study of freak trilliums that we have made—when the woods are white with the normal flowers [it] takes a trained eye to distinguish the freaks . . . My experience is that the commonest species best repay study . . .

The last three years I have been reading psychology and philosophy; starting with Huxley, I have read some of the works of Berkeley, Hume, Schopenhauer [etc.]. I read about as much German as English; and for recreation I have read a good many German dramas—and nearly all of Ibsen's, which we have in German. The nature study takes first place in spring & summer, the philosophy in winter . . .

I believe I have about got thru with the adolescent mental "growing pains," and perhaps it is not too late for me to go on with my school work and find out what I can do. I have so completely lost touch with the world I used to live in that I can not plan

intelligently what I will do—I don't know what I can do, nor how I compare with others; and the opportunity to measure myself seems to be created for me at Cornell.⁴⁸

At Cornell, Schmidt became a geology major and also fell under the influence of Albert Hazen Wright, who encouraged his herpetological inclinations. The young Schmidt was able to make a collection of reptiles and amphibians while participating in a geological expedition to Santo Domingo (the old colonial name for the Dominican Republic). Expedition leader Carlotta Joaquina Maury summarized the revolutionary climate of the country and the itinerary of the expedition, which was cut short by "the sight of seven dead men on the pier at Macoris" (Maury, 1917: 10).

In June 1916, after returning from Santo Domingo, Schmidt made his first visit to the American Museum, where he met Mary Dickerson (and Emmett Reid Dunn, see earlier) and offered his collection for her to report on. On July 6, 1916, he wrote from his family farm:

My Dear Miss Dickerson:

A break down in health prevented my getting the Dominican collection off to you while in Ithaca. I consequently brought it along to the farm, and while I am hardening to the work I can give a half day at a time to getting the material and notes together, and will ship it to you in due time. I will send you also a copy of all of my notes on color, habits, and distribution of which you can make what use you can . . . Thanking you again for your kindness on my visit.

Dickerson answered on July 13, 1916 (and wrote again on August 12) to acknowledge receipt of the collection and notes. She was impressed both by Schmidt and by the quality of his collection and, a few months later, she scraped up a small amount of money and transmitted an offer of temporary work at the Museum—an offer that unbeknown to either was to give a significant advance to Dickerson's incipient department and which was to put Schmidt on a trajectory toward a distinguished career in systematic herpetology. Schmidt eagerly replied on October 16, 1916; his handwritten letter, from the family farm, is quoted in full:

I received today Miss Field's letter with your offer for three months work at the museum. It approaches too nearly to "hearts desire" to think of refusing it,



Fig. 6. Karl Patterson Schmidt (1890–1957), another of the young men encouraged by Mary Dickerson and one of her “triumvirate,” which also included Noble and Camp (fig. 5). Schmidt was 32 years old when he resigned his position at the American Museum in order to start up the new herpetology division in the Field Museum of Natural History. When this picture was taken, the 57-year-old Schmidt was Chief Curator of Zoology at Field Museum and had rendezvoused for fieldwork in northern Mexico with an American Museum party led by Charles M. Bogert. Photographed by Bogert at Las Delicias, an isolated oasis at the southern end of the Chihuahuan Desert, Coahuila, Mexico, August 1947. AMNH Dept. Herpetology Archives.

and I shall be more than glad to take part in the programs planned. I am so fortunate as to have a hired man of unusual ability to take charge of the farm in my absence, and the next three months are the ones when my presence is least required.

The present time, however, is almost the busiest of the year, with its rush of work that must be done before the final freezing up and the changing of the stock to winter rations. I must therefore ask, if it is possible, for an extension of time to November 10th. This would enable me to vote, and I think I could leave affairs here in good order. If the postponement to the 10th should seriously inconvenience you however, or disarrange your plans for the work you intend to have done, I will crowd everything into the two weeks between now and the 1st and arrive on that date. I should in that case have to borrow money for the trip, as we have no income until the 1st or 2nd, and are "broke" at present. Please write me on this point.

Needless to say I am looking forward to the time of my life, and my desire to study "snakes and such" having been somewhat starved for four months, it will be a regular herpetological orgy for me.

With greetings for Miss Field, Yours sincerely

Dickerson was a little devious in obtaining some salary for Schmidt. Officially, she was able to get money for him to unpack and sort specimens from the 1909–1915 Lang-Chapin Congo Expedition, or to "work especially on the Congo collection of reptiles" as she put it in the annual report for 1916. But with two new collections on hand from Santo Domingo (she had sent Halter there in 1915), she also seemed interested in having those collections worked up. Her little subterfuge is alluded to by Wright (1967: 62), and corroborated by G. K. Noble on reporting his first meeting with Schmidt during a visit to the Museum in the winter of 1916:

I have an interesting bit of museum news. The herpetological department has added a new assistant . . . one Karl P. Schmidt . . . The reptiles he collected [this year on Santo Domingo] have been turned over to Miss Dickerson. Schmidt tells me he is helping Miss Dickerson on some of the Santo Domingo material, but [Ludlow] Griscom says Schmidt was appointed to work up the Congo Reptiles.⁴⁹

In any case, by the time that the three months of salary had run out, the Congo collection had become absorbing and salary was found for an additional extension until April 1917. That was the month in which the United States entered what later would be called World War I, and Schmidt's father (Chair of the German Department at Lake Forest College) was arrested the same month for "al-

leged slurs against the U.S. government that he made in front of a crowd while vacationing on his family farm in Stanley, Wisconsin" (Mitman, 1992: 56; see also note 48 herein).

Schmidt worked briefly, in June, for the "New York State Food Supply Commission for Patriotic Agricultural Services." As he lamented,

This is all very well, but it does not advance the herpetology of Africa. So far as the work itself is concerned, I would rather farm; but it appears to offer a better chance of exemption than the farm, and so far as my father is concerned, that far outweighs any other consideration . . . I feel more than ever that it is a calamity for me to be separated from herpetology . . . It is my share of the war's misfortune and I can have no complaint.⁵⁰

But Schmidt's new job was abolished on July 1, and so, in the summer of 1917, he returned to the family farm, where September found him resigned to be drafted and fearing that "the family will have a hard winter," since even the hired hand had received a draft notice. But there was a delay in issuance of Schmidt's summons, and he had perked up a bit by October 24, when he appealed to Dickerson:

Although I am unable to learn officially when I will have to go, there seems to be some probability that it will not be until at least December first. If you can arrange for my salary and some kind of a place to work, I am going to take a chance on completing the [Congo] Lizard Study. We have all of our crops in and the cows are already on winter feed, so there is no very pressing reason for my being at home longer. If you have made other arrangements, a letter will bring me the bad news slowly enough. If you wish to have me come, a telegram will bring me on the next train.

It was a telegram: "Miss Dickerson says Africa is still yours. Desk is ready. A. Field."⁵¹

Schmidt started work back at the Museum as full-time Assistant on October 29, 1917. Several months later, on March 3, 1918, he submitted the manuscript for the first part of his great work on the reptiles of the Belgian Congo, being then finally called to military service on March 18. Excluding absences from the Museum, Schmidt had spent in total less than a year from start to finish—including unpacking, sorting, cataloguing, bibliographic research, and writing—on part I of his 240-page *Contributions to the Herpetol-*

ogy of the Belgian Congo. It was his first major published work and established his status at the Museum and in his new discipline.

The end of the war found Sergeant-Major Schmidt in an officer's training camp in Kentucky, and he was released on Thanksgiving Day in 1918, after just eight months in the army. But an accumulation of problems at home was to keep him on the farm for the next few months. His mother was about to have an operation, it was impossible to get farm help (his sister was "serving valiantly as the 'hired man'"), and

My father has definitely given up teaching, and the farm has now no external source of revenue, though it is still scarcely self supporting. My own affairs are complicated by my engagement to a Very Wonderful Girl!

I have set forth the family conditions at length because I am asking for an increase in salary on my return. Unquestionably it is the work in Herpetology that I have most at heart in this world, but I could not give myself wholeheartedly to that work and to the Department unless I can relieve the financial situation at home, at least in helping with the education of the younger children; and look forward, at least with hope, to a home of my own. (Schmidt to Dickerson, December 5, 1918)

By early 1918, Dickerson had arranged a 20% salary increase (to \$150 per month, telegram of January 2), and Schmidt sent back the good news that

The success of mother's operation removes a load from my mind, for her health is of vital importance to the organization of our family, and my continued absence from the farm depends on it. (Schmidt to Dickerson, January 23, 1919)

He returned to the Museum on February 1, 1919, being formally appointed Assistant in the new Department of Herpetology that February, and waded into a variety of projects, including the second part (snakes) of the Congo Report. And he was to be married later that year.

Dickerson rewarded Schmidt's diligence, and provided a sort of honeymoon for Schmidt and his new wife Margaret, by choosing him to do a field survey of the herpetofauna of Puerto Rico, sponsored and commissioned by the New York Academy of Sciences as part of a broader scientific survey:

The museum wishes to send Mr. Karl P. Schmidt,

assistant in herpetology, who has already had some experience in the West Indies, and is particularly interested in its reptile fauna. We think that we are very fortunate to have so good a man at hand to send, for the situation down there is such that it needs a good man to bring valuable results. The work of Stejneger has covered so much of the field that to get anything besides large comparative series, the collector needs to know what has already been done, the big problem of Antillean distribution and what additional forms are likely to turn up . . . Mrs. Schmidt will go as photographer of the expedition and assistant in any collection and preparation of specimens.⁵²

Work in Puerto Rico lasted from August 3 to October 8, 1919. In route by steamship on August 2, Schmidt wrote to Dickerson to acknowledge

the atmosphere created by you and the department. It was really fine of you to think of the steamer basket, which contained surprise after surprise down to the bottom . . . We really can't express our gratitude to you all.

He wrote to Noble on the same day:

Dear G. K.:

We suspect you of a high degree of complicity in the delivery of the Steamer Basket . . . I am a bit dubious about . . . coming up to the Departmental Standard in the field, to say nothing of expectations! Here's hoping for the best.

It was only Schmidt's second collecting trip out of the continental U.S. and the first one devoted solely to herpetology. He did well, especially by not neglecting the relatively new approach of systematically collecting by night (see The "New Technique" of Night Collecting, under Some Early Department Fieldwork).

Schmidt was promoted to Assistant Curator in May 1920, but he resigned two months later to return to the farm. This was well before Dickerson's final breakdown, about which he must have received only handwritten letters (the Department of Herpetology archives are uninformative). Much to Noble's relief (see later, under Era of Gladwyn Kingsley Noble), Schmidt returned to the Museum and helped put the pieces together after Dickerson had been institutionalized.

There are a few subtle indications that Schmidt might have unconsciously distanced himself emotionally from the person, who, more than anyone, had allowed him to realize his "heart's desire" of full-time work in herpetology. Dickerson's illness had become

a public embarrassment, and her assistants and assistant curators found themselves having to clean up the remnants of a professional life that had fallen into disarray as part of her sanity was slipping away. Everyone in the Department was affected one way or another, for it probably was even harder than now to empathize with mental illness. For his part, Schmidt complained to colleagues that Miss Dickerson had left borrowed collections “in an almost hopeless tangle,” and had “balled things up rather seriously [which] has affected my estimation of her more than anything else.”⁵³ He failed to acknowledge her as having made possible his and Mrs. Schmidt’s trip to Puerto Rico (Schmidt, 1920d).⁵⁴ He became disappointed in Dickerson’s work on the herpetofauna of Lower California, finding himself “frequently at variance with her [unpublished] conclusions on the taxonomy of the fauna,” and being able to recognize only 16 (70%) of 23 species that Dickerson (1919a) had described (Schmidt, 1922a: 1–2). No warmth was shown even when naming a species, before her death, “for Miss Mary C. Dickerson, former curator of the Department of Herpetology.” Compare that with his facing-page statement of a species named “for Dr. A. H. Wright of Cornell University, to whom I owe my introduction to vertebrate zoology” (Schmidt, 1921b: 2–3). Although Schmidt also owed much to Dickerson, only years later did he fleetingly acknowledge her “herpetological importance” in the “furtherance of the careers” of Camp, Dunn, Noble, and himself (Schmidt, 1955: 613).

Schmidt finally resigned as Assistant Curator in 1922 to accept a position in Chicago as the first head of a new Division of Amphibians and Reptiles at the Field Museum of Natural History, where he was primarily responsible for building a major collection and where he much later incurred the fatal snakebite that ended a long and distinguished career (Davis, 1959; Pope, 1958b; Resetar and Voris, 1997).

In the period between November 16, 1916, and July 20, 1922, Schmidt actually worked for the Museum less than five years owing to periodic absence.⁵⁵ But he fulfilled his curatorial functions brilliantly. In addition to contributing to the well-being and growth of

the collection and bibliographic resources, he worked up and published on the large reptile collection from the Lang-Chapin Congo Expedition; he continued and expanded on Dickerson’s unfinished study of the herpetofauna of Lower California and also revised *Holbrookia*; he published on various small collections, including the one (Santo Domingo) that first drew him to Dickerson’s attention; he published on his own 1919 fieldwork in Puerto Rico; and he also started working on the early collections of the Whitney South Sea Expedition and the Central Asiatic Expeditions. See under References for a list of papers based on work actually accomplished at the American Museum during the years 1916–1922 (i.e., Schmidt, ms [circa 1917], 1919–1923 inclusive; Schmidt and Dunn, 1917).

But now the bad news. It seems that Schmidt had become overly confident in his ability to plow quickly through material from any part of the world and discern undescribed species. Schmidt was encouraged by Roy Chapman Andrews to continue studies of the Chinese collections, and he thereafter produced five papers. These were published by the American Museum in 1925 and 1927, but were written partly, if not entirely, at the Field Museum. For one thing, he created a bit of a curatorial nightmare in these works: he formally named 27 new species and a few subspecies of amphibians and reptiles in 1925 (Schmidt, 1925a, 1925b), *all* of which were again named as “new” species or subspecies in 1927 (Schmidt, 1927a, 1927b, 1927c). The 1927 papers had only brief (and easily overlooked) introductory mention of the earlier diagnoses, with much more detailed descriptions, but Schmidt was too experienced by this time not to have known that his new taxa could date only from the first descriptions and that the second descriptions were not of “new” taxa as indicated—he had been unexpectedly careless. Pope (1935) politely referenced the second citations as “amplified description of holotype” etc. Furthermore, the new taxa described in 1925 also had a very poor survival rate—a decade after their naming, Pope (1935) could recognize as valid only 27% (6 of 22) of Schmidt’s new Chinese reptiles. Pope’s (1935: v) gracious comments on Schmidt’s

"extremely thorough and conscientious beginning" on the Chinese project were made mostly in friendship and gratitude to Schmidt, who had generously bowed out of the China project and had encouraged Pope's efforts.⁵⁶

GLADWYN KINGSLEY NOBLE

There are two things which may prevent the carrying out of our plan: (1) War and (2) Dr. Barbour. I do not know which is the worse. (G. K. Noble, age 23, to M. C. Dickerson, June 21, 1917)

Mary Dickerson was eager to add the young Noble⁵⁷ to her staff, primarily because of his obvious potential to conduct collection-based research. She realized that her incipient "department" needed to publish in order to be taken seriously, but first she had to get around Thomas Barbour, Noble's mentor, who seemed to make nearly everyone nervous and apprehensive and who wanted to keep Noble at Harvard. Barbour, who held a curatorial position at the Museum of Comparative Zoology (MCZ), was only 10 years older than Noble and was a decade away from being appointed to the directorship of the MCZ. His considerable influence, however, derived from a combination of strong personality and social position (wealthy family) as well as professional status.

While still an undergraduate at Harvard, Noble had undertaken fieldwork in Guadeloupe and Newfoundland and, in 1916, had participated in a 3-month expedition to Peru. He graduated from Harvard in 1917 and would realize his Master's degree from there in 1918, but Barbour also had expected him to start work for a Harvard Ph.D. Several factors were at play to change that plan.

Because his family home was near New York City (Yonkers), Noble drifted naturally into acquaintance with Mary Dickerson, William King Gregory, John Treadwell Nichols, and others of the Museum staff.⁵⁸ Dickerson clearly had been making overtures to lure Noble to the American Museum, as evidenced by a letter that he wrote to her from Cambridge on January 5, 1917:

I . . . have learned something more of American Museum history. I am now firmly convinced of the brilliant future ahead of its Herpetological Department . . . it is evident that its herpetological collections are bound to be, within a short time, the best in the coun-

try. The Ornithology Department was started about fifteen years before the Herpetological Department. But we are looking forward to the *next* fifteen years.

I am glad you have given me the opportunity of associating myself with such an institution as the American Museum. The very thought makes me put a great deal of energy into my present work,—compiling a complete bibliography and catalogue of South American Reptiles and Amphibians.⁵⁹

Barbour was made aware of Dickerson's interest, if not the extent of her overtures, by comments that John Treadwell Nichols⁶⁰ casually included (seemingly at Dickerson's instigation) in a letter dated December 13, 1916:

I would appreciate hearing from you how Noble is getting along, [as] he was in the hospital last accounts. Personally I wish we might acquire him here to work on reptiles. I rather sympathize with Miss Dickerson's desire to have the accumulating reptile collections which belong here worked on here, and I suspect that her own administrative duties are such that she will have to acquire the services of one or more trained herpetologists if she is to accomplish that end.

Noble's next letter to Dickerson was written at Cambridge on June 21, 1917. The United States had entered the European War in April and the likelihood of military service was a worry to Noble, although he seemed more immediately concerned about his own finances and about getting Barbour's blessing for working at the American Museum:

Since our conversation of last week, I have not been able to see Dr. Barbour but I hope he will understand my urgent desire to work in New York this summer . . . I feel sure that it is to my best advantage to start work immediately under your supervision.

You told me some time ago that you were anxious to publish some reports by next fall. I have been thinking what kind of work I could do the most quickly . . . No matter how much of this work I am able to do, it seems to me advisable to spend part of my time in this Museum [MCZ], comparing your material with related forms . . . How would you consider this plan of work? On July 1st [1917] I start working in this Museum as a Research Assistant of the American Museum. I remain here for one or two weeks until I have compared all the American Museum material . . . You mentioned that I should receive for this work from one hundred to one hundred and fifty dollars a month. Could you give me a more definite statement . . .

There are two things which may prevent the carrying out of our plan: (1) War and (2) Dr. Barbour. I do not know which is the worse. Neither the exemption officers nor Dr. Barbour may understand my point of view. If I had "obeyed that impulse," I would long ago have enlisted in something.

On the same day that the above was written, Noble also penned a rambling 5-page letter about his deteriorating finances to Thomas Barbour:

Now that the Devil has nearly finished trying to break up your house and home, he has begun upon ours. Father is in the Roosevelt Hospital again. He has been forced to sell out his business at a great loss.

I intended to study next year in Cambridge, provided God and the Exemption Board is willing. But my expenses for one year in Cambridge average \$700. At present I can see no way of earning the entire amount . . . I don't want to break your trust, but feel that it would be to your own as well as to my advantage if I should leave Cambridge for the summer.

Miss Dickerson has offered me about \$40 a week . . . You may not like the American Museum,—or want me to be associated with it; but it is the only institution which will pay me enough money to put me in college next fall.⁶¹

A few days later, Noble sent a note to Dickerson saying that he *thought* that Barbour would approve his plans, but that she should

understand how difficult it would be for me to work anywhere without the Good Will and Cooperation of my teacher. You may expect me to start working for you towards the end of this week.

That got Dickerson moving again. Because the Museum Director was not acting fast enough, she went straight to President Henry Fairfield Osborn, writing on June 25, 1917:

The Museum has the opportunity of securing Mr. G. K. Noble as research assistant in herpetology. Mr. Noble has done a good many years work at the Museum of Comparative Zoölogy, Cambridge, where he is now employed . . . I have been hoping for a couple of years that the Museum might some day be so fortunate as to secure him . . . [as] he is the only available man in the country to handle technical world herpetology as now needed by the department—in fact, the standing of the department in the next few years, I feel, depends on our getting him at this time . . .

I have taken the matter up with the Director, and he is waiting for a suitable opportunity to bring it to your attention. It has occurred to me that since Mr. Barrington Moore has gone into military service, his salary will not be used [and might this] be applied to herpetology? There is a feeling that as a matter of courtesy, negotiations with Mr. Noble should not go beyond a certain point without some communication on our part with Dr. Barbour. Would you approve of my taking up the subject with Dr. Barbour under the circumstances?

Well, Osborn could also react fast, and the following day (June 26) Dickerson was able

to write to Noble that she had just sent two telegrams—one to him (“Red tape matters settled here. Welcome and 1800 salary waiting you if matter meets approval of Dr. Barbour.”) and one to Barbour:

Have letter from Noble relative to coming to New York. Truly sorry if your work inconvenienced but American Museum glad to welcome him since his home affairs makes him think it necessary to be in New York. President Osborn says you are his good friend and he hopes Noble comes with your entire approval.

Although Osborn's name should have done the trick, Dickerson also had access in her own Department (still joined with Ichthyology) to one colleague who could speak directly to Barbour and not pussyfoot around. On June 28, John Treadwell Nichols again took up his pen for her cause:

Dear Tom:

Rumor has it that you do not altogether approve of Noble's taking up herpetological work for this museum, which rumor I am inclined to discredit not having heard from you to that effect direct.

Either he would inject some of your ideas on Herpetology into this institution, where, if I may say so without undue disloyalty to the hand that feeds me, they would do no harm, or else the time and pains you have taken with his education have been wasted, and to lose his services would be of no great detriment to the MCZ.

Noble started salaried work as Research Assistant on July 2, 1917. He was still uneasy about Barbour, who also may have been irritated with Dickerson, both instances of which were alluded to by Nichols on August 2:

Dear Thomas:

Yours of July 30 at hand . . . Miss Dickerson is a member of the Board of Governors [probably of ASIH] because she was so elected in the beginning . . . I think Noble has been worrying somewhat for fear he has seemed ungrateful to, or has queered himself with you. Probably not enough to hurt him, however, as worry is in general foreign to his nature.

Noble seems to have been almost immediately assigned by Dickerson to work up the amphibian collection from the Department's 1916–1917 Nicaraguan Expedition, a project which he was to continue to work on back at Harvard. Having made enough money to finish work on his Master's degree and wishing to accommodate Barbour on the matter of some unfinished research, he appealed to

Dickerson on September 1, 1917 for a leave of absence:

When I left the Museum of Comparative Zoölogy last June to come to the American Museum, my work upon the collections of the Yale Peruvian and Harvard Peruvian Expeditions was not complete. I now request the favor of being allowed a leave of absence from this institution for eight months in order to finish this work and to complete my studies in Harvard University. I have finished part of my course work toward the degree of A.M. In the eight months I could not only secure this degree, but I should receive additional credit toward the degree of Ph.D., which I hope to take later at Columbia University.

The leave of absence would not prevent me from continuing my work upon American Museum collections . . . You would, therefore, do a great favor to Dr. Barbour and myself in granting this permission.

Although addressed to Dickerson, the above letter almost certainly was prepared with her prior knowledge for the eyes of President Osborn, who approved the unpaid, eight-month leave—not necessarily for the sole reason of doing a favor for Barbour, although that likely was a consideration. Because of her own struggle to get a college education, Dickerson was sympathetic and encouraging to her staff in such matters. And besides, Noble said that he would come back to the Museum and take his doctorate at Columbia! All through the winter of 1917, Noble kept up a stream of correspondence with Dickerson and Assistant Arline Field, who occasionally called him to task about one thing or another. Then, on April 15, 1918, Noble wrote from Harvard:

My dear Miss Dickerson:

I have been nominated by President Lowell to the next Ensign School, and have not hesitated in accepting this honor because I feel now—with the Germans in control of the eastern theater and slowly flooding the western—it is time every man should get into it. Indeed I have felt uneasy ever since returning to Harvard . . .

I would infer from Miss Field that Mr. Schmidt has left for regions unknown. It is too bad to lose such an accurate worker. Still he is far from lost. Don't you feel it to the glory of the Department to have a heavy contingent in the service. We must be next to the Ornithological Department in ranking? When the War is over we will try to out-rank them in other ways,—in scientific work,—even in their South American field.

The future course of the war was unknown, but Noble had made an emotional transfer away from Thomas Barbour and the vener-

able Museum of Comparative Zoology. Noble's allegiance was now to his Miss Dickerson and to her vision of an independent Department of Herpetology that could stand on equal footing with the older departments of the Museum. Clear allusions to his new fealty are seen in his ensuing correspondence, typically filled with herpetological gossip and reassurances to Dickerson, as on June 2, 1918:

By mistake Dr. B. put all of the A.M.N.H collections in a tray and labelled them "borrowed by Noble." It will therefore be easy for you to get those collections back again. Simply write and ask that the A.M.N.H. collections borrowed by Noble be returned (as they have been) and you will get all those collections which Dr. B. borrowed,—and also avoid any discussion. The collections contain several new species of lizards, which might just as well be worked up at the A.M.N.H. . . . I have bought a wonderful little book: "*Les Batraciens*" by G. A. Boulenger 1910. It is my herpetological bible when [in training] at sea and I receive much comfort from it . . .

There are many things I would like to ask you,—such as regards friend Schmidt etc,—but I know that you must be overburdened with work,—especially now that your crew has dwindled away. But your men have not deserted. They have been shang-haied by the War and will return—I pray—before long.

By September 8, 1918 (letter), Noble had been promoted to Cadet Officer and was expecting to be sailing with "a good position in the fleet," but by early November he had been assigned to code and cipher work in the Office of Naval Operations in Washington, D.C. The war was already ending and, on December 6, Ensign Noble's application for discharge from active service was accepted. With characteristic energy, he utilized his nearly two months in Washington to the fullest advantage. As Assistant Coding Officer, Noble's watches were mostly in the evenings, leaving time for "preparing myself in a small way to aid in the culmination of our plans," as told to Dickerson on November 16, 1918:

Dr. Stejneger has given me free run of the National Museum. He has also secured special permission for me to work *at night!* I have looked over many of the recent accessions . . . I have spent half of two days in a most remarkable library of South American books—that of the Pan American Union. When we come to extend our plans [for South America] I hope to put some real information in your hands . . .

I have spent several afternoons studying a special preserving technique employed in the laboratories of

the Army Medical Museum. Major Shufeldt has given me special facilities, and when I return to New York I hope to be able to give you some brand new War-made technique . . . The Neuro-Histological Laboratory here at the Medical Museum is a very up to date one, and I have enjoyed the work very much . . .

But tomorrow, since all the buildings are closed, Blanchard⁶² and I are going on a "herp" walk. I wish that Dunn was not so many miles away.

By early 1919, two of Dickerson's triumvirate—Noble and Schmidt—were back at the Museum, and Dickerson recommended both for appointment "to the position of assistant in herpetology on the scientific staff of the American Museum."⁶³ Schmidt was appointed Assistant on February 19, but Noble received a higher appointment as Assistant Curator on that date. Regardless of title, Dickerson expected hard work in those positions. The War had been frustrating for her and she had a lot of catching-up for her assistants to do. The tenor of the time was captured by Noble in a letter written on February 21 to Thomas Barbour, who still had his demands:

Schmidt and I are plugging away day and night. We promised Miss D. to "clean up by the end of the year all the old jobs which have been on the Department's hands for so long." This means that we have contracted to finish up what is left of the Congo, and Nicaraguan, collections, as well as to identify the odd lots from China and South America . . .

The logical time for me to throw my whole spirit into finishing up the [MCZ] Peruvian Collection is when my work here turns toward South America. Miss D. has been very good to me, and I am sure that she will allow me some time for finishing that Peruvian work. But she is very anxious to make this a "clean up year." . . . Now Schmidt and I work most of the evenings, but next summer he is planning for me to stand the "big dog watch" alone. He intends to get married next July,—and thereby hangs a multitude of obligations.⁶⁴

The year 1919, therefore, was a busy one. In addition to the department chores, including preparation of the Congo amphibian manuscript, Assistant Curator Noble apparently started his doctoral studies at Columbia University and spent time on dissertation work under Gregory—work that was to become a classic treatise on anuran morphology and classification (Noble, 1922b).⁶⁵

Noble and Schmidt also made time in 1919 to do some fieldwork together in the New Jersey Pine Barrens at Lakehurst,⁶⁶ a locality to which Noble returned with other

colleagues over the next several years. Such excursions provided not only enjoyable diversions for Noble but also resulted in an important scientific paper (see Noble in the New Jersey Pine Barrens, under Some Early Department Fieldwork).

Noble would need whatever relaxation he could find.

CHARLES LEWIS CAMP

Mary Cynthia Dickerson offered me a place in the Department of Herpetology . . . in the fall of 1919 . . . I provided myself with a good binocular microscope, sharpened a small pair of scissors, obtained a delicate pair of tweezers and the smallest needles available, ground the points of these down on an oil stone and proceeded to lay bare the anatomy of a nice fat Phrynosoma. (Camp, 1971 [new preface, see Camp, 1923])

Although C. L. Camp (1893–1975) ended his days as a paleontologist and historian, he had youthful herpetological inclinations (Adler, 1989: 80–81⁶⁷) that he later was encouraged, even pressured, to develop at the American Museum. A thin correspondence folder⁶⁸ sheds light on this early part of his career.

The 23-year-old Camp must have come under Dickerson's influence soon after coming to New York for graduate studies at Columbia University. Her first letter (June 5, 1916) was a gentle reminder of Camp's apparent promise to collect for the Museum during his summer in California; she closed by saying, "I shall hope to see you about many matters of mutual interest in herpetology work in the field on your return to New York."

Although not recorded in the Museum's existing payroll records, Dickerson had Camp working for her by early 1917, when he provided a 2-page handwritten report "of work done by me [through March] in the Department of Herpetology since February 20, 1917," including 24 hours on bibliographic research and 62 hours cataloguing and identifying reptiles. There also exists his report dated May 6 for work done in April 1917.

But April 1917 was the month in which the United States entered the Great War that had been raging for several years in Europe. A year and a half later, in the fall of 1918, First Lieutenant Camp was with the Ameri-



Friends of 1st Lieut. Charles L. Camp have learned that at a recent dress parade in France he was awarded the French War Cross with gold star for service in the Argonne. Lieutenant Camp was working in various positions and in herpetology at the American Museum and Columbia University prior to his coming to France. He has served with the 7th Field Artillery, 1st Division. At present he is giving courses in nature to the men of the 1st Infantry. In being the father of the boys he has received, he wrote, "There was just desire the decorations are, however, distinguished."

Fig. 7. Charles Lewis Camp (1893–1975), the third of Mary Dickerson's "triumvirate," about 1918. From *Natural History* 19(3): 354, March 1919 (the caption was probably written by Dickerson).

can Expeditionary Forces on the decisive drive through the Argonne of northeastern France, for which he received a major decoration for gallant action—the *Croix de Guerre* with gold star.

By early 1919, Camp's return could be foreseen. Gregory passed correspondence from Camp's father to Dickerson. She wrote to Camp on March 7, 1919:

... we are very proud of you. Also I address you in the hope that you may be able . . . to take the position waiting for you in the herpetology department. The money is safe in the budget now and I shall hold it until I hear from you. Dr. Gregory has been talking with me regarding the matter. He seems to think it would be advisable that you write your thesis for your doctorate at the University on a herpetological subject. However, I remember your devotion to paleontology.

The other worthies of the triumvirate are here, zealously at work. Have you seen Mr. Noble's two papers the Museum brought out before he did his patriotic duty as Ensign! And you will be glad to know that Mr. Schmidt's paper (and its size is prodigious) was in page proof to greet him when he came back as Sergeant Major.

Camp replied on April 17, saying that he was pleased to receive her kind offer in the Herpetology Department and that the following August would be the earliest date in which he was likely to be discharged. William King Gregory either saw Camp's letter to Dickerson or received a similar one of the same date, and on May 12, 1919, he wrote the pivotal letter that decided Camp's immediate future:

I have been considering very carefully the problem of your work for next year, and have had very helpful conferences with Miss Dickerson and Noble. It is very pleasant to report that the other two of the herpetological triumvirate very cordially and actively desire your return to the fold. Noble has given me many valuable suggestions as to possible lines of work. Miss Dickerson also is desirous of having you work in the department of herpetology, and is willing to give you suitable material for a dissertation problem to be worked up during your museum time. In the budget for the year 1919–1920, beginning in the fall of 1919, she will set aside a certain sum which would bring in about 70 to 75 dollars a month for three days a week work in herpetology on your dissertation problem. Together with the 25 dollars a month from the Dyckman fellowship this would perhaps carry you through.

I feel that it is highly desirable for you to work up the herpetological problem for your dissertation, partly because I have become very enthusiastic about the possible future of herpetology in this museum and in

the country at large and also because it provides a position for you here. The kind of work that you [Camp] and Noble and Schmidt have done is about to make a place for itself. Miss Dickerson believes that there would be plenty of room both now and in the future for you three men in the museum as the field is so vast. At present I know of no such good opening in vertebrate palaeontology.

The second reason why I would urge an herpetological problem is that it would enable you to make use of the two lines in which you have already done considerable work—first, herpetology proper, and second, comparative myology of reptiles. Miss Dickerson and Noble think there is abundant material in their department for some such topic as adaptive radiation of the Iguanidae or the contrasts between arboreal and terrestrial Lacertilians, material which would offer an opportunity for a combination of systematic herpetology with comparative anatomy.

My third reason is on the grounds of economy of time and effort. In this way you will surely be able to finish up all your Ph.D. work in one year, while if you have to give several days a week for work outside of the Ph.D. work you will never be able to finish your dissertation within a year. If it should happen that you determine to take up vertebrate palaeontology as such I feel that this work in herpetology would be very helpful for a vertebrate palaeontologist, although as I said I feel that there is a greater need at the present time for men who will combine the systematic and anatomical and palaeontological as you would be likely to do in the future.

I am sending a copy of this letter to your father as you will probably wish to advise with him on the matter before giving us a definite answer. Miss Dickerson will hold the position open [and in] any event you have been nominated for the Dyckman fellowship.

Assistant Curator Noble's "valuable suggestions," referred to in the first paragraph above, had been put in writing on the same day (May 12, 1919) that Gregory's letter was written:

My dear Dr. Gregory:

Having consulted Miss Dickerson in regard to Mr. Camp I am in a position to state that the Department of Herpetology is very willing that Mr. Camp should spend all of his time not taken up by course work at Columbia on almost any herpetological problem which might interest him. Certain morphological problems have suggested themselves because of the abundance of material in this Museum and because of Mr. Camp's special training in this field. Miss Dickerson has recommended others, and I am sure that Mr. Schmidt and I, who have been closely associated with Mr. Camp in our bibliographic endeavors could think of many similar problems of special interest to ourselves and, we hope, to the absent member of our "triumvirate."

- (1) The Morphology of *Sauromalus*, with Special Reference to its Myology.

- (2) The Comparative Myology of *Iguana* and *Sauromalus*, a Study in Muscular Adaption.
- (3) The Morphology of *Metopoceros*, a Contribution to the Phylogeny of the Pacific Iguanid Genera.
- (4) The Muscular Adaption in the Brachial Complex of Certain Arboreal Iguanids and Agamids.
- (5) The Muscular Changes Correlated with the Degeneration of Limbs in the Scincidae.
- (6) The Osteology and Phylogeny of the Anguidae.

The above are only suggestions, but suggestions based upon material available. If Mr. Camp has some other problem in which he is interested we will borrow the material necessary to undertake such a problem.

Two days later, Dickerson wrote another letter to Camp confirming that she would hold a half-salary of \$75 per month from the time that he arrived and would make a similar arrangement for the 1920 budget, and again her expressing hope that he would work at least temporarily in herpetology "even if you turn over to work in palaeontology later."

On September 5, 1919, Camp wrote to Dickerson that he was with his parents and expected to be with her later that month and that "I have been thinking over many ideas for a thesis and believe the origin of recent lizards might prove a profitable topic."

In her published report for 1919, Dickerson noted with satisfaction that

The staff was increased in October when Mr. C. L. Camp, formerly of the University of California, returned from France. His thesis on the "Comparative Myology and Osteology of the Lizards" for Ph.D. at Columbia University, will be prepared as a part of the work of the department, and published in the American Museum *Bulletin*.⁶⁹

Camp's dissertation was his primary responsibility, and he settled on an approach that let him consider extinct as well as Recent taxa. But Gregory's notion that the work could be done in a year was not realistic: Noble's annual report for 1921 described progress of Camp's work, and its completion was mentioned in the report for 1922.

Camp's *Classification of the Lizards* (1923), which was published by the Museum as Dickerson had planned, is still widely admired and the subject of periodic commentary (for references, see Pregill and Frost [1988], who observed that "modern squamate systematics clearly dates from [its] publication").

AMNH payroll records show that Camp

was paid as a half-time Research Assistant starting September 24, 1919, and that he worked in this capacity through 1920 and most of 1921; after that he continued his career at the University of California at Berkeley (see Adler, 1989: 80–81; Estes, 1988), where much later he served on Richard Zweifel's doctoral committee.

HER LAST VISION

*With them the seed of Wisdom did I sow,
And with my own hand wrought to make it grow;
And this was all the Harvest that I reap'd—
"I came like Water, and like Wind I go."*

(Edward FitzGerald, 1809–1883)

By 1920, Dickerson had accomplished something remarkable. Despite other truly heavy responsibilities, she had built a functioning department from scratch, emphasizing collection growth and literature facilities in order to support the twin functions of exhibition and research in herpetology. She had pioneered herpetological exhibition and had actively recruited gifted assistants who could do curatorial work and who could start and finish their own collection-based research. Her new department was a recognized research center. All this in a decade.

Dickerson envisioned that the "worthies" of her triumvirate—Noble, Schmidt, and Camp—would all be promoted to assistant curatorships. Noble had received his promotion in early 1919. Schmidt had just been promoted to Assistant Curator in May 1920, only a few months before resigning to return to his family's farm.⁷⁰ With Schmidt's salary thus vacated, Dickerson was determined not to lose Camp, who she erroneously thought was about to finish his dissertation. Several days after Schmidt's departure on July 14, 1920, Dickerson wrote to the Museum Director recommending Camp's appointment and setting forth her final hopes and vision for the Department of Herpetology:

As curator of the department of herpetology, having in mind the advancement with as few years delay as possible to a position where the work can tend more nearly on a par with older departments of the Museum, I hereby recommend that Mr. Charles L. Camp be offered an assistant curatorship in herpetology . . . [effective] October 1, 1920, and the attainment of his doctorate from Columbia University . . .

It is my desire that the research and exhibition work of the department should proceed not only

along systematic and biogeographical lines . . . but that it should especially develop fundamental morphological and other problems . . . as side issues. Mr. Camp's aim to carry on his comparative anatomy studies therefore fits exactly as a preliminary step into my hope for the ultimate high accomplishment of the department. His immediate interest in the reptiles of the Orient will probably insure us early publication on a systematic study of our Chinese collections.

Mr. Camp will without doubt receive other offers of positions but I have given him to understand that except for official sanction from the President and the Director who have always been in cordial sympathy with the ideals of the department, the position of assistant curator in herpetology is open to him if he desires it.⁷¹

But Camp's need of another year to finish his dissertation likely was of minor consequence when things started falling apart in the last months of 1920. Dickerson's dream of a Herpetology Department vigorously staffed at the curatorial level, and on some kind of par with the older departments, was not to materialize in her lifetime. Although her goals were within reach, she was losing a battle in her "troubled mind." Both her plans and her sanity were in disarray by November, when even her valued "staff of assistants" were not immune from her paranoid delusions (excepting perhaps Schmidt, who had left).

For Noble, handicapped by Schmidt's absence and struggling between loyalty to Dickerson and his own ambition, it had become the worst of times. He turned back to his former mentor, Thomas Barbour (possibly his only confidant), to whom he gave news after Dickerson's first removal from the Museum⁷² and again after the final incident on December 10:

Miss D. remained just one day in Cleveland. Back she came and straight to the Museum. Again the painful scene . . . I think all hope of her coming back here has officially vanished. A beautiful reward for the many evenings she worked until two in the morning.

I do not yet know how much the Administration respects the training you have given me or whether they will trust me with the responsibilities of the Department . . .⁷³

Barbour could now see advantages to having his former student in New York and advised Noble that,

I am writing a letter to Professor Osborn which I hope may have some slight effect in persuading the Mu-

seum to give you a free hand to remain in charge of the Department of Herpetology.⁷⁴

On November 22, 1920, three days after her first involuntary departure from the Museum, Director F. A. Lucas had directed Noble to take charge of departmental matters "In the absence of Miss Dickerson." But that was administrative housekeeping without implication of permanency or hint of any decision regarding the new Department's future. The last weeks of 1920 were a time of great uncertainty, as Noble expressed to Barbour on November 27:

... we are very unsettled,—not knowing whether the Museum will economize by throwing us all out in the street. At present the work goes on,—and in the long run it is chiefly work which counts.

Noble's dedication to work, eerily reminiscent of Dickerson, would carry the Department through a difficult transition.

ERA OF GLADWYN KINGSLEY NOBLE, 1921–1940

G. K. Noble succeeded Miss Dickerson as head of the department, as she had perhaps intended (fide Schmidt, 1955: 613), and he enjoyed a prestigious career at the American Museum (figs. 5, 8, 10, 47, 48).⁷⁵ First, however, he had to get through the last month of 1920 and a stressful 1921. Schmidt had earlier resigned in July 1920, and Camp was only a half-time research assistant assigned to work on his dissertation. It was sink or swim for the only staff member left in Herpetology.

In December 1920, Noble was asked to prepare the annual report for that year, the departmental budget for 1921, and to give attention to labels and other aspects of the herpetology exhibits—all things that Dickerson had been accustomed to doing for *two* scientific departments (additional to her editorial work) but that were perhaps somewhat unsettling for Noble, who must have felt that he was on probation. The optimistic Director Lucas thought that Noble might also like to do some fieldwork in the Panama Canal Zone, to which Noble replied on December 21 that

work in the Department is going forward so slowly with our reduced staff that any further delay would be disastrous. I should like nothing better than to get

into the field again but I do not see how I can go now with a clear conscience.

Noble entered 1921 as "Assistant Curator, In Charge," still faced with cleaning up the remnants of Dickerson's research on the southwestern fauna and in getting back to his own research, especially the multifaceted nature of his dissertation work, in which he was afraid of losing track of the many details. He also had been feeling pressure from William Beebe,⁷⁶ who believed Noble to be too slow in identifying material from the British Guiana Tropical Research Station, which Beebe had established with President Osborn's encouragement. Director Lucas, who was interested in how Noble was going to be spending his time, got a long response from Noble on February 11. More than anything else, this document hints at the stress that Noble was feeling because of supposed obligations to Mary Dickerson as well as his judgment that his ongoing thesis was his most important work at that time:

Since our conversation in regard to herpetological research for the present year, I have gone over all of Miss Dickerson's notes and I am now in a position to state more definitely the extent of the work which you have considered advisable for me to commence, and the amount of time which it would allow for other duties.

It would seem expedient for me to go over at once Miss Dickerson's incompleting manuscripts and with the specimens before me to see what portions . . . might be published . . . of course under Miss Dickerson's name. I might then isolate the Lower California material and write a report . . . Lastly, and perhaps the most difficult task would be the rough identification and return of all loans of southwestern lizards at present in the Museum . . . If I devoted two days a week to the work I believe I could complete a satisfactory and moderately illustrated report within the year.

In accordance with your suggestion I have brought my study of the Beebe material to a close . . .

Some years before I came to the Museum I started an intensive study of the structure and phylogeny of the frogs and toads. As I explained in my talk before the Academy [probably N.Y. Acad. Sci.], the classification of the Salientia is in a very unsatisfactory state. During the past two years I have made considerable progress on my problem. It was with Miss Dickerson's approval that I have devoted ever since I came here from one to five days a week on the work. Dr. Gregory was much interested in the progress, and I had planned to present this June the first part of this work as a thesis for my doctorate. During the past few months I have made no progress on the thesis and I feel that the many details which I have



Fig. 8. Gladwyn Kingsley Noble in 1939, the year before his death. AMNH Photographic Archives 120974.

brought together during the past four years will be largely lost unless I can turn once more part of my time to a completion of the work. Dr. Gregory, under whose supervision the thesis has been most recently advanced, is also aware of the urgent need of my continuing the work while the details are still before me. I believe that if I could devote two and a half days of each week to the completion of this thesis I could also carry on, as I have done during the past

two years, my other duties, both those of faunal study and those of department routine.

During my six years of herpetological work at Cambridge, I always devoted more time to morphological than to taxonomic work. Nevertheless, I published during that time fifteen taxonomic papers. Herpetology is valueless unless based on an exact knowledge of internal structure and that knowledge can only be gained by the constant study of material.

Thus even if I were in a position to lay aside my work on the Salientia, I should consider it advisable to take up some other structural work to be carried along in conjunction with the faunal study. As the Albatross report would be a purely faunal one I consider it most desirable to carry on at the same time the morphological work which has not only been my chief interest during the past four years but also my most important herpetological study.

Noble's plans to recover Dickerson's work, which was unorganized with "over a hundred beautiful photographs—largely without data—and nearly a thousand dollars worth of drawings," were unrealistic if he hoped both to carry on department routine and to complete his ambitious dissertation on the osteology and the thigh musculature of the Salientia. Director Lucas seemed to see through the problem and wrote on February 14 that all the proposed work met with his approval, but he advised Noble that

I might suggest that for the present you devote as much time as possible to your morphological work, for I should be very sorry to have "the work of the last few years largely lost," the more that, like yourself, I firmly believe that morphology is the basis of all sound taxonomy.

Noble's despair was to be relieved by communication from Karl P. Schmidt that he wished to return to the Museum. Noble put together a partial-year salary from various nonsalary parts of the 1921 budget and gleefully wrote to Barbour in April:

Since you were here it has been definitely settled that Schmidt will return to the Museum. It seems that his wife does not like the farm. We have offered Schmidt a permanent position and he will return to us within a few weeks.

This puts a very different aspect on my pessimism. I realize my obligations to you—also to Beebe, Murphy, the National Museum—as well as my personal interest in South American material. I am planning to divide the work—research and chores—with Schmidt. This all means that I will get back to my South American work very soon . . . I believe you understand that I am trying to complete as soon as possible my doctors dissertation. Last fall I carried the South American and dissertation work along together.⁷⁷

By "dividing the research," Noble meant turning the Dickerson projects over to Schmidt, which led to a quick cluster of papers (Schmidt, 1921a, 1921b, 1922a, 1922b), but which may have contributed to Schmidt's emotional distancing from his former patroness (see earlier section under his name). By

the fall of 1921, a reenergized Noble could report to Barbour that

Schmidt has practically finished his Lower California work and I have just completed my thesis. We dare now look forward to a grand and glorious future.

Noble also got married in 1921 to the former Ruth Crosby, an Assistant Curator in the Department of Education. He also apparently relaxed by continuing local fieldwork in New York and New Jersey.

Schmidt was to give his final resignation the following summer in order to start up his own operation at the Field Museum of Natural History closer to his own family—but Schmidt clearly had been of tremendous psychological and bodily help to Noble in his first difficult year as head of Herpetology. As suggested spottily through the narrative thus far, Noble and Schmidt *seem* to have been friends during their shared time at the American Museum, although Schmidt's feelings toward Noble may have been changing (see later under From Gossip to Legend: Noble and His Staff).

Noble had acquired a departmental philosophy from Dickerson, and for the first years he ran Herpetology much as she had done. He continued and even expanded on departmental work devoted to exhibition and personally contributed to the advancement of exhibition techniques (see under A Century of Exhibition). In addition to his own fieldwork, Noble continued Dickerson's tradition of acquisition by arranging sponsorship for departmental expeditions—including A. I. Ortenburger to Arizona (1923), C. M. Breder to Panama (1924), W. D. Burden to Komodo (1926), and W. G. Hassler and G. Klingel to the West Indies (1929–1935)—as discussed under Some Early Department Fieldwork. Meanwhile, specimens poured in from the Central Asiatic Expeditions, the Whitney South Sea Expedition, and many other large and small Museum expeditions. Noble worked at the Museum for 23½ years. During the 20 years that he was in charge, the herpetological collections more than doubled, from 50,000 specimens in 1924 to 110,000 specimens in 1940, and he continued and expanded on Dickerson's bibliographic initiative (see appendix 1).

Noble produced an astonishing array of

systematic and behavioral papers (see appendix 3). His *The Biology of the Amphibia* (1931c) was a remarkably authoritative synthesis because of his own mastery of fields as diverse as anatomy, endocrinology, and neurology (Gregory, 1941, 1942), and he was perhaps the first herpetologist to consider the potential of biochemical systematics (Boyden and Noble, 1933).

Noble's expansion into experimental projects was influential in the developing field of animal behavior and led to the establishment within the Department of Herpetology of an experimental facility unique among museums.

Noble's reputation had led to attractive offers from outside the Museum at a crucial time when his cause *within* the Museum could be championed by W. Douglas Burden, chairman of a 1928–1934 trustee Committee on Herpetology (other departments had similar committees). In a 1928 meeting of the Board,

Mr. Burden paid tribute to the excellence of the exhibition hall of Reptiles and to its educational value. He reported on the progress of publication, which included a report on the Chinese reptiles by Assistant Curator Pope, and experimental studies by Curator Noble on the causes of blindness in cave animals. Mr. Burden . . . recommended that the name of the Department of Herpetology be changed to the Department of Herpetology and Experimental Biology.

At the same meeting, President Osborn in turn acknowledged

Mr. Douglas Burden for the splendid work he has done in the Department [of Herpetology], both through the Komodo Expedition and through the retention of Doctor G. K. Noble as head of his department . . . In recognition of Doctor Noble's loyalty to the Museum and his eminence in research the President [also] recommends that the name of the Department be changed . . .

Thus, the department's name was changed at that time (May 7, 1928) to the "Department of Herpetology and Experimental Biology."⁷⁸ As is well known, the 1928 expansion of the department was a reflection of Noble's expanding research interests and intellectual vigor (e.g., Gregory, 1941, 1942; Mitman and Burkhardt, 1991). But Noble's contemporary prestige can best be recalled by the following extraordinary passage in the 1928 "Report of the President" (Henry Fairfield Osborn)—a statement that, incidentally,

hardly jibes with recent assertions (Rainger, 1991: 134, 138, etc.) that Osborn broadly "opposed experimental biology on methodological and philosophical grounds" (see note 238):

A serious crisis in the history of the American Museum arose last year when Curator G. Kingsley Noble, who had just completed the admirable arrangement of the Hall of Reptiles and Amphibians along entirely novel biological lines to illustrate principles of adaptation and of evolution, received in succession calls to two of the most important universities of the country—Columbia [to replace T. H. Morgan⁷⁹ as full Professor of Experimental Zoölogy] and Cornell [as full Professor of Microscopical Anatomy]—to head the instruction and research in the branches of experimental biology and physiology which have made such strides in America and throughout the world during the last few years. The Trustees were faced with the alternative of losing the services of Dr. Noble or of creating within the Museum a new Department of Experimental Research. The sentiment, among the younger members of the Board especially, was unanimous, and by means of very active effort, aided by the President, this new division of the work was planned and proper provision was made for future experiment and research in the Department of Herpetology. Under these circumstances Dr. Noble decided to decline these very tempting offers and to continue within the Museum the lines of experimental work in which he has already achieved very important results.

Provision is being made to insure not only the equipment but the adequate endowment for assistants. At the same time it is felt by the younger members of the Board and by the President as well as by several members of the scientific staff that the biological value of the exhibitions in many of our halls can be enhanced by very careful coordinated study . . . As these problems apply to every Department of the Museum, and yet require a special technique of investigation, the President and the Trustees have changed the scope and name of the Department of Herpetology to cover Experimental Biology as well. The new Department has already made important discoveries concerning the relation of the endocrine glands to certain species of Amphibia, and has extended the work to fish. Within the year the great importance of the stimulus of light in maintaining the well-being of the eyes has been clearly demonstrated in the case of certain cave animals. Many species of animals are defined by differences of dentition, and the new Department has taken up a study of the factors controlling tooth forms. The dependence of some of these differences on certain hormones has been demonstrated during the year. A specialized type of piercing tooth was made to give rise to a more primitive crushing tooth by removing the sex hormone from an adult animal. The Department is extending such studies and experiments to other animals and to other structures. It has been established, for example, that the secretion of the anterior lobe of the pituitary gland controls the

growth of the long bones. Does, therefore, a giant species of mammal or salamander differ from its nearest relatives of smaller size merely in having inherited a large pituitary? By applying the results of the Museum and the university laboratories to wild species of animals, important contributions to our knowledge of the mechanism of life and evolution may be expected.⁸⁰

But not everyone approved of the new direction in which Noble was taking the Department. K. P. Schmidt expressed his views to Noble from the Field Museum in August 1928:

I now have gone over to Nichols' view and deplore your defection from Systematic Zoology. You should be Curator of Experimental Zoology and get a new Cur. of Herps. There are far too few systematists at work to keep things identified.⁸¹

Several years later, in early January 1934, Experimental Biology was split off as a separate department (eventually to become the Department of Animal Behavior after Noble's death).⁸² But the year just past, 1933, in the depth of the Great Depression, was the year in which the Works Progress Administration (WPA) was established. Although lavish Museum support of Experimental Biology could not continue, Noble's large laboratory suite (fig. 9) atop the Museum was completed in 1934, and he was able to acquire dozens of WPA assistants of all kinds, which allowed Experimental Biology programs to proceed at a relatively fast pace. Mitman and Burkhardt (1991: 179) stated that

in the mid-1930s there was no other research facility anywhere in the world—with the possible exception of Karl von Frisch's laboratory in Munich—that could compare to Noble's in its combination of resources and its commitment to the study of animal behavior.

Noble's experimental facilities focussed on vertebrates, but in the 1930s he also provided space and (in 1936) a research associateship to Libbie Hyman, who was starting to write her classic, 6-volume treatise, *The Invertebrates*. Noble expected Hyman to continue her experimental studies with invertebrates. Her increasing disinclination to do so was a source of frustration probably for both, and she called Noble "a liar and a hypocrite" in a letter to a confidant (quoted in Schram, 1993: 136 [also in Winston, 1999: 16]). Concerning that letter, however, Schram (1993:

135) suggested that the problems Hyman outlined may have merely reflected "Noble's clumsy attempt to protect her feelings"—from the brutal fact that, as a woman and as a Jew, she was unwanted in the Department of Invertebrates. In any case, Noble and his department provided Hyman with a safe haven for over a decade. (Finally, on June 10, 1943, Hyman was appointed Research Associate in Invertebrates, where she spent the rest of a long and singularly successful career [see Winston, 1999]).

Ruth Crosby Noble (1945) later summarized the vast range of experimental issues in vertebrate biology that were addressed by her husband and his staff. More recently, Gregg Mitman (1992: 196–197) reminded us that, under the laboratory coat of the experimental biologist, Noble remained a systematist at heart:

From 1935 until 1940, Noble developed a program of animal behavior study that utilized the techniques of endocrinology and neural surgery to establish a detailed picture of the mechanisms responsible for social behavior in the evolution of the vertebrates. Unlike Allee, Noble viewed behavior within the context of phylogenetic relationships and instincts, tracing similarities in behavior to common ancestry rather than to environmental relations. His perspective was that of a systematist rather than an ecologist [emphasis added]. By analyzing the social behavior of fishes, reptiles, birds, and finally mammals, Noble hoped to ascertain how far phylogenetic changes in neural structure had led to differences in social behavior patterns. For Noble, behavior was to be understood in the neurophysiological structures and processes ingrained in the individual organism as a consequence of its phylogenetic past [emphasis added].

Noble's understanding of social behavior was almost completely oriented around sex. In *The Biology of the Amphibia*, published in 1931, Noble devoted considerable discussion in a chapter on instincts and intelligence to the evolution of courtship behavior in salamanders, detailing how courtship patterns of the various families of salamanders were all modifications of the pattern found in the most primitive group. Regardless of the organism involved, be it salamanders, jewel fish, or black-crowned night herons, the methodological approach of his behavioral studies in the late thirties was identical. He first gathered extensive information on the sexual behavior patterns of the organism in the wild, next performed an analysis of hormonal effects on these behaviors in the laboratory, and then used ablation techniques to isolate the neural centers involved. In this way, he hoped to compile a phylogenetic history of the evolution of courtship behavior from fish to humans.



Fig. 9. Part of Noble's new laboratory suite for his Department of Experimental Biology, May 1934. AMNH Photographic Archives 314414.



Fig. 10. G. K. Noble taking movie footage of an alligator (see text) ca. 1939–1940. AMNH Dept. Herpetology Archives.

As also noted by Mitman (1993: 648), “Noble expressed an avid interest in the potential of cinema for research and educational purposes.” Mitman described and interpreted Noble’s film on *The Social Behavior of the Laughing Gull*. It is uncertain how many short films Noble may have made or how many may remain uncatalogued in Museum archives. An undated photograph (fig. 10) of Noble filming in an alligator pit was explained only in a letter written by Noble a few weeks before his death:

Dear Dr. Gregory:

Here is the film for your Tuesday lecture. It will run about 7½ minutes normal speed. It includes the cottonmouth moccasin, a flash of the giant chameleon [Cuban *Anolis*], then the full alligator story . . . we endeavor to collect alligators in the wild but end up at a large alligator farm, where all the pictures that follow are taken . . . close-ups of various bull alligators bellowing as a result of a gun shot . . . when males call, they do so to protect their territory rights. The gun shot stimulates them to call as much as the roar of another bull alligator. I lay down in the alligator farm to get some worm’s-eye views of alligators walking [and then] we come to the story of how it seems to be eaten by an alligator . . . one which suddenly makes a grab for me with the result you saw. The last scenes are alligators eating my shirt and farewell with the vulture sitting on the post.⁸³

In view of Noble’s tremendous scope and

range of interests, it needs mentioning that he never renounced or lost interest in the basics of systematic herpetology. The last scientific paper written under his sole authorship and published the year of his death (Noble, 1940b) was the description of a new frog from Madagascar.

My respect for Noble has grown enormously during this brief excursion into his career, and I regret not having known him. Nonetheless, I also have concluded that it was unfortunate that Noble remained administrative head (“Curator”) of both Herpetology and Experimental Biology from 1934 until his death in 1940. That this was in some way undesirable was recognized by Roy Chapman Andrews, newly ensconced as Director, in 1935:

Doctor Andrews . . . expressed his opinion that as soon as possible it would be advisable to relieve Doctor Noble entirely of the responsibility of the Curatorship of Herpetology by the appointment of another Curator. This arrangement would enable Doctor Noble to devote his entire time to Experimental Biology, his major interest in the Museum.⁸⁴

Two years later, Noble acknowledged this sentiment in a statement that I judge to have been more a political ploy than a real attempt to divest himself of Herpetology.

The Department of Herpetology . . . is in an unfortunate position. It is administered by a curator, who is also the curator of the Department of Experimental Biology and thus only part of his time is available. In addition there is one assistant curator [C. M. Bogert] who has only recently been employed. Thus because of lack of personnel the development of the department has been very greatly handicapped . . . money available for the purchase of [alcohol and glass jars] is far below the needs . . . It is essential that the department have a full time curator [who would be Noble's replacement] assisted by an associate curator of new world reptiles and an associate curator of old world reptiles; also a scientific artist . . . and additional money for the publication of scientific papers which would be immediately produced . . . Funds are needed for the purchase of specimens to fill gaps . . . Expeditions, particularly to South America and Africa, will yield great scientific returns. Not only will these add much needed study material but will produce several striking exhibits for the Hall of Reptiles which can only be obtained by a trained collector . . . For the development program as outlined about an annual budget of \$32,150.00 is necessary.⁸⁵

The above statement is the only one known to me of conditions that might have been acceptable for Noble to voluntarily give up control of the department that always held his heart. But Noble certainly knew that his conditions were unrealistic for the late 1930s and were scarcely likely to be met in the near future. He was suggesting a budget nearly three times larger than his 1937 Herpetology budget (which was \$725 for operating expenses plus \$10,875 for five salary lines)!

Therefore, owing to Noble's preoccupation with administering, fund raising, and conducting research in Experimental Biology, the Department of Herpetology was rather allowed to drift. Noble had come close to admitting as much, in private correspondence, a few months after the establishment of Experimental Biology as a separate department:

Experimental biology during its early growth secured considerable nourishment from its herpetological parent, and probably to the latter's detriment.⁸⁶

But matters seem to have gotten increasingly worse. There was a series of highly competent assistants in Herpetology during Noble's last seven years—including assistant curators C. H. Pope and C. M. Bogert, and assistants C. Kauffeld, W. G. Hassler, and R. Snedigar—but there was no one (other than the preoccupied Noble) fully in charge of, able to speak for, or to raise money for Herpetol-

ogy. Noble furthermore "borrowed" salaried Herpetology staff for use in Experimental Biology, which he could scarcely have done if the departments had been truly independent. In a 1937 letter to Director Andrews, Noble wrote:

One of my most time-consuming jobs is the direction of the W.P.A. model makers and artists who are developing a series of exhibits of the Animal Mind. I would like to recommend a plan which would relieve me considerably and further give Hassler the work he is best fitted to carry forward. Would you approve of my placing Hassler in charge of these workers? He has already shown great aptitude in handling them. On the days these craftsmen and artists are not in the Museum, Hassler could continue working up his Santo Domingo collection . . .

This arrangement should last only while the exhibition work is in progress. During this period Arthur Schmidt should be loaned from herpetology to [experimental] biology in order that the care of the [live] animals will not suffer. Since Schmidt's salary is [less than] Hassler's, it is only fair [!] that Hassler should do work for both Departments during the period of loan. Incidentally, Hassler would be pleased with this arrangement as it would give him greater opportunity to exercise his mechanical ability.⁸⁷

The Director may not have objected to such obfuscation, but Hassler did and resigned a few months later. Excerpts from Hassler's unhappy letter of resignation are given in the section following.

Three years later, Noble was to die unexpectedly on December 9, 1940, when he was but 46 years old.⁸⁸ A great career had been cut short.

FROM GOSSIP TO LEGEND: NOBLE AND HIS STAFF

To create an unfavourable impression, it is not necessary that certain things should be true, but that they have been said. (William Hazlitt, 1778–1830)

Noble was talented and energetic, admirable gifts that often are squandered by those who have them, as well as envied by those who lack them. Noble was also uncommonly *focused*, which led to his becoming one of the most accomplished biologists of his time. His abilities were recognized by his contemporaries, who, however, had trouble grasping the grand sweep of his plans. Thus, Noble's achievements seem better appreciated today than formerly. But his successes certainly generated jealousies that were easily fueled by his difficult temperament. Envy some-

times spawns malicious gossip, and Noble's reputation appears to have suffered as a result. Incorrect or embellished stories and half-truths have circulated by word of mouth for decades and have found their way into print.

Noble's effect on the sensitivities of some of his contemporaries has become somewhat of a legend that, in the nature of legends, has grown unduly with time. I recall hearing stories during my undergraduate years and even after joining the staff of the American Museum about how an unjust Noble had fired or forced junior colleagues to leave the Department of Herpetology, assertions that warrant closer scrutiny.

Adler's (1989: 91) phrase "abrasive personality and tremendous ego" is not in dispute for Noble. The ego part is almost a given, considering Noble's goals and seeing how he wrested his Experimental Biology facility into being; also, "abrasive personality" seems to fit as well as any other description. Curiously, however, these traits are not evident in Noble's published writings, and I do not think that they can be easily derived from examination of his correspondence, which tends toward rational discussion and economy of words, rarely with a bit of humor (e.g., his term "Eleutherodactylace" in a letter to Dunn, for the notoriously large frog genus *Eleutherodactylus*).

That Noble had an abrasive side, however, was alluded to in a memorial service held little more than a week after his death. Douglas Burden, patron and friend, remembered that

Dr. Noble may often have seemed brusque or curt, but these mannerisms concealed an extraordinarily human, touching and lovable character. Wherever he went, men of any walk of life who got to know him well grew to love him. For those of us who did know him well he was a constant source of inspiration and as fine a friend as can be found.⁸⁹

His widow, Ruth Crosby Noble, added that

He realized his unsocial inclinations in many ways and was often strangely touched by such expressions of personal affection. He was so *very* human underneath . . . One of the pities of his going was that he seemed to me to have just reached the stage where he could look at life philosophically, where he could enjoy his friends, his family, and his work without the driving worries which had always pursued him.⁹⁰

A few of my elder associates have confirmed from memory that Noble was likely to leave an unfavorable impression on first meeting young, unestablished colleagues.⁹¹

The late George Sprague Myers, on the other hand, believed that his professional career might have been aborted without Noble's vigorous intervention:

Dear Bogert:

I was indeed shocked to hear of Noble's death. You know I started out, as a high school kid, working in his lab and [John Treadwell] Nichols's. I should probably never have gone to college if Noble hadn't taken me aside and given me one of the worst tongue-lashings I ever had—and I shall always feel grateful to him for it. Although many herpetologists have not liked him, his death is a tremendous loss.⁹²

It is of course doubtful that Myers appreciated his scolding at the time, and Noble's approach, although effective in this case, could scarcely be recommended as the way to counsel young colleagues. And Noble did have an interest in the young, at least judged from his thick correspondence folder labeled "Boy Scouts," for whom he served as the "National Counselor in Reptile Study" and oversaw Hassler's (1927b) preparation of the *Reptile Study* merit badge pamphlet (see also Noble, 1922f, 1927i).

One may suspect that at least a small part of Noble's brusqueness was of the sort that not infrequently characterizes productive scientists with heavy administrative burdens. Noble accomplished a staggering amount of impressive work in a short life, and certainly he was disinclined to "waste" important working time over unprofitable conversation or correspondence. He was as work-driven as his predecessor, Mary Dickerson. He was, for example, one of only two curators who voted in favor of keeping a six-day working week for Museum employees.⁹³ Nearly two decades after Noble's death, Pope (1958a: 490) probably got his measure with the following words:

Noble was a resourceful, dedicated worker who concentrated nearly all his efforts and strove incessantly to achieve his goals, but he was ever ready to share an opinion and give advice. During his rare hours of recreation with friends he was jovial and expressive.

Fieldwork, although taken seriously, possibly qualified as recreation. Several sources have indicated that he was a good companion in

the field. At the Museum, however, he was driven and seemingly prone to be abrupt and demanding. Regardless, it is difficult to reach judgments because of contradictory statements or actions from those involved with Noble, as exemplified by two of his earliest colleagues, Schmidt and Dunn.

K. P. SCHMIDT: Schmidt was the first herpetologist to be hired by Noble. Although Schmidt was of course first brought to the Museum by Dickerson, he had resigned before her incapacitation in order to go back to his family farm. I have already recounted Noble's enthusiasm when Schmidt wanted to return to the Museum in 1921, as well as the important role that he played in helping Noble get through that difficult year. Schmidt resigned ostensibly to head up his own operation at the Field Museum and to be nearer to his family. Noble and Schmidt seem to have been friends during at least most of their shared time at the American Museum. Schmidt's subsequent correspondence, starting shortly after his arrival in Chicago, was usually initiated with a remarkably informal (for those days) salutation, as in the following note written in 1930, nearly a decade after his leaving the American Museum:

Cher G. K.:

I delayed reply to your kind invitation to stay with you on account of uncertainty of plans [but] I will be happy to stay with you—we can again settle the affairs of the herpetological world, as we so often have in the past.⁹⁴

What then are we to make of Schmidt's private statements in 1949? He wrote that

Like a long succession of colleagues after myself, I found it impossible to work under Dr. G. K. Noble, who had replaced Miss Dickerson as head of the Department of Herpetology when I returned to it in 1921 . . . Charles M. Bogert was the last of the long line of assistants [to Noble], in which I was the first. He was no more able to continue as a subordinate to Noble than had been his predecessors, but *by the happy accident of Noble's death* [emphasis added], succeeded to the Curatorship of Herpetology.⁹⁵

Did Bogert confide such a view to Schmidt in the long course of their own developing friendship? I have seen no evidence that Bogert ever seriously contemplated leaving the American Museum while Noble was alive, and, in response to George Myers' let-

ter (quoted above), Bogert claimed that he *did* get along "pretty well" with Noble:

I imagine that many people feel as you do about Noble, for while he was aggressive and not particularly tactful with all of his acquaintances, he certainly had a remarkable memory, pretty good training, and an exceptional amount of energy. Personally I got along with him pretty well, and when he was working in the field he was much more companionable than many other workers.⁹⁶

I put the matter to Robert F. Inger (who knew Schmidt well) that I either could take K. P. Schmidt's "early comments about camaraderie with Noble at face value or else assume a high degree of hypocrisy." Dr. Inger responded thus:

Hypocrisy, it may have been. Or the care taken by a junior professional in his direct dealings with an established powerhouse. But KP told me that he and Emmett Dunn developed a plot which, of course, they didn't intend to carry out. It was to be completely guiltless in the eyes of the law. One of them would say something that was calculated to arouse Noble's easily fired, violent temper. Then, just before Noble had a chance to calm down, the other of them would pull the same kind of stunt. So off Noble would go, according to this plot, to perhaps an even higher level of choler. And so on, back and forth between these two stupid assistants until hopefully Noble would have apoplexy. Who knows he might even die of it. KP would chuckle, his own ample belly shaking, as he told this story, relishing the satisfaction he and Dunn had just from plotting.

You know, of course, that Clifford Pope shared KP's view of Noble and, later, while both Pope and KP were active here, another of Noble's long suffering assistants, Bernard Greenberg, started doing some work in our lab. So the three of them would occasionally tell "hate Noble" stories. Their intense dislike of Noble had nothing to do with their estimate of Noble's work—which was high.⁹⁷

Although Schmidt was to become the "dean of American herpetologists" (Adler, 1989: 91), it seems likely that his "intense dislike" of Noble was motivated to some extent by jealousy of the latter's position and meteoric career. Dickerson had hired Schmidt first, but, as he later observed, "Noble succeeded her as Curator of Herpetology, as I believe she had planned," and went on to mention that Noble created a new department "With lavish financial support from [American Museum] trustees" (Schmidt, 1955: 613, 614). It may not have helped matters that Schmidt became closely associated in Chicago with Warder Clyde Allee and his students. In con-

trast to Noble, Allee had trouble funding his ecologically oriented animal-behavior program, which contrasted with Noble's phylogenetic approach. (For a contrast between the two approaches, see Mitman and Burkhardt [1991]; also, see Mitman [1992] for an in-depth analysis of the Chicago tradition.)

Whatever his true feelings, Schmidt carried on a congenial correspondence until Noble's death. For his part, Noble always seems to have thought highly of Schmidt and to have regarded him as a friend. Noble expressed condolences on learning of the accidental death of Schmidt's brother Frank, saying that "Your brother was certainly one of the most promising of the younger naturalists." Noble seems to have thought of Schmidt's visits to New York as special occasions, as suggested in a 1924 letter to E. R. Dunn: "Will we see you this week end? Schmidt is here now and possibly you could spare us a few minutes to have a grand reunion."⁹⁸

E. R. DUNN: Dunn, who like Schmidt was to become a major figure in American herpetology, seems to have shared Schmidt's jealousy of Noble. Dunn did not have Schmidt's excuse of having worked in a salaried position under Noble, but he probably envied Noble's position and resources. Dunn also may have felt a need to compete for the attention of Thomas Barbour, a mentor both to Noble and himself.

Dunn (1925: 370) mentioned "my friend Noble" on a page of *The American Naturalist*, but a different perspective comes across in an letter from Dunn to Thomas Barbour—four handwritten pages of gossip clearly intended to denigrate Noble, apparently written following one of Dunn's visits to the American Museum prior to Schmidt's final resignation in 1922. Dunn said that Schmidt was upset because Noble got to go to Santo Domingo and had unfairly arranged to have his Congo frog paper published ahead of Schmidt's Congo snake paper. (Noble did make a successful expedition to Santo Domingo in 1922, but his Congo monograph would be published in 1924, the year following Schmidt's.) Dunn then listed a number of other people (including Camp, see below) purportedly sore at Noble. For his own part, Dunn bragged to Barbour that

I am not particularly wroth with him due to my Christ-like nature and to the fact that I sit over him with a stronger hand (in the salamander field at least) and can, and have lit on him, & expect to occasionally—a few harsh words bring him crashing down from the treetops.⁹⁹

Dunn benefited more than Schmidt from his relationship with Noble, especially in the 1920s when Noble provided important new collections for study and chose Dunn to join Burden's 1926 expedition to Komodo. Dunn seems to have visited the Museum fairly frequently (but probably more for specimens than to see Noble), and Noble urged in correspondence that Dunn should write more often. Surviving letters in the Department of Herpetology Archives show Dunn and Noble freely criticizing each other's views (in marked contrast to the usually complimentary tone of correspondence between Schmidt and Noble). Later, in the 1930s, their letters were sometimes strained and accusatory when research interests overlapped, but the two usually seemed able to compromise. Noble seems to have held Dunn in high respect, but written interchange tapered off by 1937 (when C. M. Bogert started handling most herpetology correspondence).

C. L. CAMP: Although written corroboration is sparse, it seems that the early camaraderie among Noble, Schmidt, and Camp (Dickerson's valued "triumvirate")—and among those three plus Dunn (her "quadrivirate")—became strained by the early 1920s after Noble had taken charge of the Department. Dunn's venomous letter to Barbour in 1922 (cited above) referred to a problem at the Museum between Noble and Camp concerning the latter's dissertation. Noble seems to have honored the arrangement under which Camp had been hired by Dickerson to work solely on his dissertation, but Dunn claimed that

Camp is sore because Noble went to Gregory and said he didn't want to publish Camp's thesis, giving various criticisms and telling Camp nothing about it—if successful this would probably have kept Camp from getting his Ph.D. But Gregory immediately called in Camp to confer with Noble and himself. Ere Camp departed west he cursed G.K.N. to his face.

The archives shed light on this assertion, which seems to be only a half-truth. William King Gregory had asked Noble to review a

draft of a letter (not seen) that he was writing to President Osborn "relating to Camp's work" (letter, Gregory to Noble, May 2, 1922. Dept. Herpetology Archives, Noble Collection). Noble's full response follows:

I thoroughly approve of the letter which you intend to send to President Osborn in regard to Camp's work. I have only one suggestion to make. As Mr. Camp secures additional material, I feel sure that he will want to elaborate the plates, possibly revising certain ones entirely and putting in further innervations. From the American Museum's standpoint, I would hardly recommend the publication of plates based upon the study of a single specimen unless that species should be extremely rare. I make this statement because I look back on how my own ideas changed as my work on salientian myology progressed. I make the above suggestion without having any conference with Camp, but I think that there can be no doubt that as he works with additional material he will want to revise some of his plates. Is it your plan that the plates are to be published in their present form? If not, let us strike out the words "now ready" in your third paragraph. (Letter, Noble to Gregory, May 3, 1922. Dept. Herpetology Archives, Noble Collection)

There is no indication that Camp's graduation was in jeopardy. In view of the comments solicited from Noble (who had the responsibility of vouching for any manuscript going from his department to the editor of the Museum's *Bulletin* series), Gregory may have decided that the plates were not needed for what would be an already well-illustrated (112 figures) published version of Camp's thesis. That would explain Camp's later comment that "With only two or three exceptions, the larger plates remain unpublished to this day" (Camp, 1971 [new preface, see Camp, 1923]).

Camp's last graduate student, the late Richard Estes, provided another story about Camp and Noble that can be tested. Estes (1988: 11) wrote that it

was particularly interesting to hear Camp talk about his graduate years [at the American Museum], and to hear many anecdotes about the people who worked at the museum. He told me once about how he had dissected out some interesting aspects of the musculature of a particular frog. G. K. Noble came by, and Camp, filled with enthusiasm, told him all about it. Some weeks later Camp found out that there are some people to whom you do not reveal your ideas: Noble had just published a short paper using Camp's data!

A damning tale of plagiarism, but is it true? Did Camp in fact leave his lizards long

enough to make an interesting observation in Noble's area of anuran myology? An examination of Noble's bibliography (appendix 3) for the period from 1916 to 1923 revealed only two "short" papers concerning frog morphology. Either might have been published within a matter of "weeks" while Camp was at the Museum. However, one paper (Noble, 1920c) concerns a subject on which Noble had been in correspondence with John Van Denburgh; the other (Noble, 1920e) contains descriptions of new frogs in the R.D.O. Johnson Colombian collection that Noble had been working on for several years (see Noble, 1917). Finally, neither of the 1920 papers contains anything about musculature! As noted by Adler (1989: 91), Noble "gave credit where it was due," and the present discordant story does not stand up to examination.

Although Schmidt and Dunn corresponded with Noble for many years, there seems to have been virtually no interchange between Camp and Noble except for letters from the Department during 1929–1933, repeatedly asking for return of specimens borrowed by Camp in 1922, soon after he had left the Museum. If Camp did in fact curse Noble "to his face," a residual coolness between the two might be expected.

As already quoted, Schmidt asserted that there was a "long line of assistants" who "found it impossible" to work under Noble. This was true in a few cases. However, unless one discounts a resignation because of illness in one instance, and assumes in certain other cases that better job offers would have been declined if Noble had been a jolly fellow, Schmidt's statement is patently exaggerated and malicious on the face of it. Excluding Schmidt himself, Noble hired eight other herpetologists, who will be discussed in the following order:

Arthur I. Ortenburger, Assistant Curator, 1922–1923 (1½ years)
 William G. Hassler, Assistant, 1924–1937
 Demetrius Theodore Tidy (later Sinitin), Assistant, 1927
 Charles E. Burt, Assistant Curator, 1929–1930 (1 year)
 Carl F. Kauffeld, Assistant, 1930–1936
 Robert Snedigar, Assistant, 1937–1939
 Clifford H. Pope, Assistant Zoologist for the

Third Asiatic Expedition, 1921–1925; Assistant in Department of Herpetology (Central Asiatic Expeditions budget), 1927; Assistant Curator, 1928–1934¹⁰⁰

Charles M. Bogert, from Assistant to Assistant Curator and Curator, 1936–1968

A. I. ORTENBURGER (FIGS. 11, 48): Assistant Curator Ortenburger's one and a half years were well spent, since he finished a major revision (his Ph.D. dissertation for the University of Michigan) and was sent by Noble to Arizona to collect material for a Gila monster habitat group (which he and his wife did very successfully). Noble seems to have been generally pleased with Ortenburger, only reprimanding him (at least in writing) for not following Museum rules in taking a vacation. Although Noble seems to have been preoccupied with "rules," to be fair, this may simply have reflected administrative thinking of the time.¹⁰¹

Ortenburger was hired to replace K. P. Schmidt and could have stayed at the Museum had he wished, but he had at the beginning expressed reservations about wanting to live in New York, and he resigned in order to take a position as Assistant Professor of Zoology at the University of Oklahoma.¹⁰² Carolyn Ortenburger, who visited the Department some years ago to see where her grandfather had worked, said that he had been proud of his position there. See References for papers attributable partly or entirely to Ortenburger's one and a half years at the Museum (A. I. Ortenburger, 1922–1928; Ortenburger and Ortenburger, 1926).

W. G. HASSLER (FIGS. 12, 50): Assistant Hassler was only 17 years old when he started working for the Department of Herpetology in 1924. Hassler originally had planned to go into electrical engineering, but summers at the Boy Scout Camp at Bear Mountain turned his interest to Herpetology.¹⁰³ After Schmidt left, Hassler became Noble's most valuable assistant. At the Museum he had responsibilities both with the study collections and with the maintenance of Noble's growing animal colonies. Hassler participated in exhibition work, collecting material and preparing specimens in the field (by Noble's wax infiltration method) for habitat groups (e.g., fig. 51); he also devised the push-button rattlesnake (fig. 37). He did fieldwork

with Noble from New York to Maryland and conducted projects for Noble in the New Jersey Pine Barrens. Noble's insatiable need for living specimens sent Hassler to Tennessee and Florida. During 1929–1935, Hassler conducted three important expeditions to the Dominican Republic and Haiti, which resulted in significant additions to the research collections and the exhibition programs, as well as multitudinous living specimens for experimental biology (see The Department Infiltrates Hispaniola, under Some Early Department Fieldwork). A shipwreck kept him from joining up with Klingel in the West Indies in 1931 (see Wreck of the *Basilisk*), and the Great Depression kept him from being the first Herpetologist to collect on the Venezuelan tepuis (see the "1931–1932 Pacaraima-Venezuelan Expedition," under Lost Worlds). See Hassler (1927–1935) and Noble and Hassler (appendix 3: 1933g, 1935b, 1936c) for most of his published work during this time.

Although Hassler had unsuccessfully aspired to a staff position (i.e., to the old title of "staff assistant"),¹⁰⁴ he got along for years with Noble, who valued his work.¹⁰⁵ The problem seems to be that Hassler was *too* dependable, and when finances got tight, Noble started running him from one project to another, both in Herpetology and, increasingly, in Experimental Biology. Noble seems to have been insensitive in this regard, and Hassler gave his letter of resignation in the spring of 1937:

My present position in your department is largely one of being the "goat" in a kaleidoscopic jumble of "W.P.A.s" and your schemes and projects. In the past I have been shifted from one thing to another depending on what was most advantageous to your aims at the time. Nor have I any assurance that the situation will improve and my future be more attractive and secure.

Therefore, I hereby present this, my resignation to become effective on and after May thirty first.¹⁰⁶

Despite the tone of this letter, Hassler seems to have regained a friendly respect for Noble and later offered to collect for him during a stay in Haiti, on his way back from the Terry-Holden Expedition to British Guiana.¹⁰⁷

In retrospect, Hassler was one of the Department's most versatile and valuable employees. His departure probably was the one



Fig. 11. Arthur Irving Ortenburger (1898–1961) and Mrs. Ortenburger examining a Gila monster during 1923 fieldwork in Arizona. Ortenburger served a brief but productive stint as Assistant Curator during 1922–1923. AMNH Dept. Herpetology Archives, courtesy of granddaughter Carolyn Ortenburger.

real loss to the Department of Herpetology that can be blamed on Noble.

DEMETRIUS THEODORE TIDY (LATER SINITSIN): This person, evidently a Russian émigré

about 56 years old, listed himself in an unpublished manuscript as “Doctor of Zoology, New York, Formerly Privat-Docent of the Imperial University of Moscow.” He was



Fig. 12. William G. Hassler (on left) with John King's older son in the Dominican Republic, 1929 or 1930. (King was a Dominican contact who facilitated and assisted in AMNH fieldwork starting with Noble's 1922 expedition.) Hassler, the most valuable of Noble's assistants, worked in Herpetology for 13 years (1924–1937). He spent a substantial amount of his time on Noble's field projects, from New Jersey to the West Indies. AMNH Photographic Archives 287535.

hired under the name Tidy, changing it to Sinitsin sometime during his short term of employ, the details of which are somewhat enigmatic.¹⁰⁸

Noble evidently expected Sinitsin to tag and catalogue specimens and to work at identifying the South American lizard collections. Sinitsin's position was not a research one, but it probably was understood that he could conduct investigations on his own time. On August 7, 1927, however, Sinitsin wrote to Noble at Woods Hole, advising him that

Identification of our collection of South American lizards, at this time, has stopped to progress, as I "chose" to concentrate my attention on describing a

new species of *Prionodactylus* (Teiidae) that I have found in the Marias's collections from Colombia.

Noble's response (probably handwritten) is not available, but one can guess at his reaction. In a subsequent undated letter (written sometime in late September), Sinitsin applied for his vacation, which he pointedly said would mostly be used to prepare his paper, adding that "All days payed by the Museum, during September, I tagged and catalogued Pope's China Collection, as you wished."

Sinitsin was dismissed, presumably by Noble's directive, at the end of the year. He subsequently was employed in the Bureau of Animal Industry of the U.S. Department of Agriculture, where he was involved in inves-

tigations of "intermediate hosts of the liver fluke." His new herpetological career was thus aborted.

He published two papers based on work at the Museum (Sinitsin, 1928, 1930). The last one was published by Noble's intervention a few years after Sinitsin's dismissal. Sometime in late 1928 or early 1929, Sinitsin submitted for Museum publication a 53-page manuscript on *Some of the platyrhine Teiidae owned by the American Museum of Natural History*, which included purportedly new species of lizards, including one to be named after Noble. In a letter dated January 26, 1928, however, Noble advised Director Sherwood that Sinitsin's manuscript was not publishable, but he offered personally to

... pick out those species which are most likely new, to correct his manuscript for those species, and publish the paper under his name ... the problem now is to smooth out the matter without causing further friction.

Sherwood relayed Noble's offer to Sinitsin, who gladly agreed. Two years later (February 11, 1930), Noble advised Sinitsin that

I have gone very carefully over the manuscript which was left in the Museum and find that only one species is really new. In accordance with our agreement the manuscript dealing with the species has been revised and sent to the press. I enclose a proof of this paper. Mr. Burt who has recently taken charge of the South American work has assisted in the revision as stated in the footnote.

Assigning Burt to the task was not a good idea. The new species was the Bolivian *Neusticurus ocellatus* Sinitsin, 1930, which Sinitsin's original manuscript recognized solely on the basis of the holotype. Burt, however, editorially added 54 "paratypes" from a Peruvian locality about 1000 km from the type locality, creating a composite species in Sinitsin's name. It has only recently been shown (Vanzolini, 1995) that two species are involved, and that Sinitsin's *N. ocellatus* remains known to this day only from the holotype.

Noble never became aware of Burt's ineptitude in such matters, but there seem to have been other problems enough.

C. E. BURT: Like Ortenburger, Assistant Curator Burt also was a doctoral student at the University of Michigan when hired, but Burt spent only one year on the job and was

not reappointed. His position evidently could have been extended had he and/or his wife (May Danheim Burt) not displeased somebody—possibly the Director, possibly Noble, or both. Noble seems to have been impressed with the work of Burt and his helpmate, but scarcely a half year after their arrival, Noble alluded to difficulties in a handwritten letter to Frank N. Blanchard, who had recommended Burt for the job:

Dear Blanchard:

May I ask a favor which would help greatly in arranging my plans? Today I learned on good authority (not from the Burts) that Barbour has been casting some remarks, not at all complimentary, regarding Burt and his work. I brought the Burts to N.Y.C. chiefly on your recommendation and they have been working very hard and, so far as I have seen, accurately on their problems. I realize that Burt and especially his wife are not easy to handle. But why should Barbour, and from Burt's account, everybody else go so far out of their way to smite them? Is it because of Burt's disposition? His lack of tact? His wife's way of trying to run his affairs? ... but after all he seems to have ability ... Could I ask you for a confidential statement? Please write to my home address, and I shall destroy the letter immediately.¹⁰⁹

Blanchard's reply is not known. Several months later, Noble wrote again with the bad news

I feel that I owe you a note concerning the Burts. For nearly a year they have worked furiously and effectively over our collections. They have done a prodigious amount of work and have some five or six papers to show for this day and night grind. However, regulations, rules and even official directions they have cast aside in this mad scramble for scientific results. I need not go into details. The last episode was too much for the Director and he has refused to reappoint Burt for next year.

This is most unfortunate but certainly Burt could not go on indefinitely this way. I hope, however, that between us we can find Burt a job. He has great abilities ...¹¹⁰

A few days later, Noble wrote to Thomas Barbour under the pretense that all was well and that Burt had been hired without possibility of continuance:

By special appropriation we have had the pleasure of the Burts' assistance during the past year. The appropriation will be exhausted in August. They have done a tremendous amount of work here. In fact, no one—Schmidt included—has identified and arranged so much material in so short a time. If you could arrange to have them come to Cambridge for a year I feel sure your collections would benefit enormously. They are particularly strong on American material but can

handle any collection in record time. When you come to the ASIH meetings I shall be glad to show you what they have done here.¹¹¹

It seems curious that Noble was less than frank with his old mentor, but he conceivably might have felt that Barbour's purported gossiping about Burt had reflected badly on himself for hiring the man. In any case, Noble's belief in Burt's abilities was faulty in the opinion of some of his successors in the Department, including Bogert (e.g., comment under Whitney South Sea Expedition), Zweifel (verbal commun.), and me. Concerning Burt and Burt's (1931) report on the Museum's South American lizard collection, Vanzolini (1978: 74) observed that

The collection of the American Museum already was, at the time this paper was published, one of the largest and best in the world, but the Burts' article does it no justice. It contains (as later work has shown) a large proportion of misidentifications and wrong generic assignments and should be used with much care, or perhaps better avoided.

As with most fast workers, the Burts unfortunately were careless, and gross misidentifications attributed to them still show up from time to time.

Burt went from the Museum to Trinity University in Waxahachie, Texas. He subsequently became Professor of Biology at Southwestern College in Winfield, Kansas, until about 1944 or 1945, after which he and his wife operated Quivira Specialties Company (selling animals and biological supplies) in Topeka, Kansas, where C. E. Burt died in 1963. Most (if not all) of the papers attributable partly or entirely to their year in New York are listed in the References section (Burt, 1930–1932; Burt and Burt, 1929–1933; Schmidt and Burt, 1930).

C. F. KAUFFELD: Assistant Kauffeld¹¹² resigned for a position of greater responsibility more to his liking, namely Curator of Reptiles at the Staten Island Zoo. Conant (1975: 27), who knew Kauffeld well, considered this to have been an "escape from the brilliant, autocratic, and always suspicious" Noble. There is little evidence of Kauffeld's impact in the Department archives, although, as noted by Adler (1989: 117), his presence helped allow Pope to devote full time to writing the *Reptiles of China*. Several of Kauffeld's earliest papers (1931–1936) show his

Museum affiliation (see Adler [1989] and Conant [1975, 1997] for biographical accounts).

R. SNEDIGAR: Assistant Snedigar had worked in the Museum's education department before coming to Herpetology, where he had several busy years. He collected for the Department on the 1937–1938 Terry-Holden Expedition to British Guiana, where he probably contracted a respiratory infection that caused him to resign and move to Tucson for recuperation in the summer of 1938.¹¹³ Snedigar was a resourceful collector, which was fortunate since his letters to Noble reveal that the Terry-Holden Expedition was poorly run. He was listed as a member of the Department of Herpetology on the title page of his successful book, *Our Small Native Animals*, which was published in 1939. Noble, recognizing that "this book will be a source of income to Mr. Snedigar," apparently recommended that the affiliation listing be approved by the Museum.¹¹⁴ A few years after Noble's death, Snedigar was reemployed in the Education Department of the Museum (1943–1945), after which he became Curator of Reptiles at the Chicago Zoological Park.¹¹⁵

THE POPE AFFAIR, 1935

Clifford Pope (fig. 57) had collected in China as an assistant on the Third Asiatic Expedition and, after his return, drifted into an assistant curatorship in the Department of Herpetology (as discussed later under Andrews and Pope in China). He was to become the only herpetologist on the scientific staff who was actually *dismissed* during Noble's tenure or at any other time in the Department's history. (Sinitsin was not a staff member, and Burt simply was not reappointed after a year's probationary period.) Pope was in fact dismissed twice in the same year, but *not* for the reason implied or asserted in several published sources, starting first with one written by Charles M. Bogert.

After arriving at the American Museum, Bogert became a close colleague of both Schmidt and Dunn (the latter being brought into the Department as a Research Associate during Bogert's era), and he also was friendly with Pope. I have already discussed Schmidt and Dunn's apparent jealousy and resent-

ment of Noble, and it now seems likely that their ensuing gossip colored Bogert's assumptions about events that occurred at the Museum before his time. Thus, Bogert innocently promulgated in print a myth that Clifford Pope had lost his position because of Noble. It is somewhat distressing to conclude that Bogert (my esteemed predecessor) is not a reliable source on this matter, and that his understanding of Pope's firing probably derived from gossip rather than from any real knowledge.

Bogert (1975: 24) implied that Pope "lost his position as assistant curator [because he] aroused the ire of G. K. Noble," and Bogert went on to mention (p. 25) that his friend K. P. Schmidt had been "outraged when Clifford lost his job at this museum." Bogert attributed Noble's "ire" to Pope having devoted most of his time to completion of his great work on Chinese reptiles, with consequent inattention to other departmental duties. Bogert was wrong (as he was also wrong when he called Noble a departmental "chairman," since that title was not introduced until 1942). Noble certainly could be aroused, but I can find no evidence that his anger was ever used to the real detriment of colleagues (leaving aside the matter of bruised egos), and, as shown below, Noble himself had authorized Pope to spend all his time finishing the book.

Bogert later read Adler's (1989: 94) manuscript sketch on Pope and did not object to the statement that Pope

lost his curatorship at the museum . . . when he aroused the wrath, and perhaps also the jealousy, of G. Kingsley Noble, his department chairman.

Conant (1997: 472–473) most recently elaborated on this theme, claiming "Noble's summary dismissal of Pope" and repeating the story that Pope's *Reptiles of China*

gained him considerable prestige in the herpetological community, but it also led to his downfall. He was elected president of the American Society of Ichthyologists and Herpetologists, but his success and popularity earned him the wrath (jealousy?) of his boss at the museum, the brilliant but autocratic and always suspicious Gladwyn Kingsley Noble. Suddenly, in the midst of the Great Depression, Pope found himself without a job and with a wife and three small boys to support.

But Noble was not jealous of Pope and did not dismiss him. Rooted in gossip, these statements are in error and do Noble a further injustice because they convey the false impression that he *wanted* to get rid of Pope. It was a complicated story, which we may pick up with a letter that Pope wrote to the Museum administration a month *before* his imminent dismissal (Pope's use of the phrase "past connection" presumably indicates his awareness that he was about to be dismissed):

I understand from Dr. Noble that he is submitting a letter dealing with my past connection with the Department of Herpetology and before this letter is accepted as fact I would appreciate the opportunity of presenting my record as I see it . . .

As far as cooperation with Dr. Noble is concerned, I must admit that there have been difficulties. In my opinion, these have been due largely to the great length of time consumed by research on the enormous collections of the Central Asiatic Expeditions.¹¹⁶

The letter by Noble to which Pope referred is quoted in full starting on page 51, but Pope may have misunderstood the purpose of Noble's letter. Pope presumably wrote his letter after hearing about one part of Noble's letter of the same date (March 20, 1935), because, *in explaining a 1931 resignation that he really had tendered for the purpose of returning to China*, Pope corrected Noble on a technical point by saying that "I have never been offered a position of any sort in China."¹¹⁷ The allusion to difficulties with Noble, as quoted above, was only an incidental comment in Pope's four-page document, in which he admitted that he had spent *all* his working time for the preceding three years (1932–1934) on the China book. Pope would have had no reason for disagreeing with Noble's statement that he had been "For the last three years . . . relieved of all departmental duties of every description" in order to complete the book. In fact, Pope's full acknowledgment "of the generosity of Doctor G. Kingsley Noble in relieving me for so long a time of my usual duties as Assistant Curator" was then in press (Pope, 1935: vii).

Nor was there a scintilla of pettiness in a review of Pope's book, which was judged by Noble to be

not only an exhaustive treatise on the herpetology of China but a handy reference book for the quick identification of any Chinese reptiles . . . a similar, up-to-date source book does not exist for the herpetology of America. (Noble, 1935i)

Although Noble might have been frustrated over the loss of Pope's services for several years, his approval of the work itself and recognition of its importance can be taken for granted. Furthermore, Noble realized, as had Dickerson before him, that generating a variety of publications was important to the Department; Pope had been allowed an extended period of research much like that which had been accorded to Camp by Dickerson and then Noble.

Noble did indicate in his letter of March 20 that Pope did not follow Museum rules very well, doubtless meaning that Pope would not qualify for promotion to a post with administrative duties (even from assistant curator to "assistant curator in charge"). But the other purpose of Noble's letter was to circumvent Pope's predetermined dismissal on the coming April 30 and to find salary for at least the remainder of 1935. Furthermore, Noble later was to ask for Pope's reinstatement in the 1936 budget (see below)!

Based on Museum and Department archives, a reason may be arrived at for Pope's dismissal, but it must be examined in the context of an atmosphere that came to prevail at the Museum in the 1930s. Pope's dismissal was pushed mainly by Director Roy Chapman Andrews, who had been his superior during the Third Asiatic Expedition and who was Vice-Director in Charge of Exploration and Research when Pope travelled to Europe for study of Chinese materials in June 1932. The following fall, Andrews rather peevisly wrote to Pope:

When are you coming home? I hope that you will not expend more money than what was appropriated for your trip because we simply cannot use more than that out of the few remaining funds. All the rest of the money of the Central Asiatic Expeditions has been allotted.

Mrs. Chilovsky wrote me from Paris that she had finished the translation of another book for you and asked if she should send it and the bill to me; not knowing where you were, I had her forward it here. It was not until Mr. Hatt received a card from you a few days ago that we knew what your address was.¹¹⁸

The reason for Andrews' nervousness about finances would have been obvious to anyone reading New York newspapers that year. For example, the following lead in the *New York Herald Tribune*, January 5, 1932, read: "Natural History Museum Halts 12 Expeditions—Prof. Osborn Finds Funds Lacking This Year for Exploration and Research." Soon after, in early 1933, Henry Fairfield Osborn stepped down after serving a quarter of a century as Museum President. Osborn's replacement was F. Trubee Davison (formerly an Assistant Secretary of War under Herbert Hoover), whose presidency at the Museum was to usher in a drastically changed atmosphere that generally de-emphasized scientific programs and research, particularly after Andrews became Director.

Noble himself appears to have lost considerable influence under Andrews' directorship, as shown by comparing the following two excerpts from minutes of Board of Trustees meetings in early and in late 1934. In January 1934, at the meeting in which Herpetology and Experimental Biology were split into separate departments, the following praise was accorded to Noble (George H. Sherwood was still Director at this time and Andrews was his Vice-Director):

President Davison then spoke of the action of the Trustees in creating the Department of Biological Research [error for Experimental Biology] and of their pledge to Doctor Noble, who assumed the Curatorship of it, and expressed regret that the Trustees had not been able to carry out in full the terms of their agreement. He expressed his deep appreciation of Doctor Noble's generous attitude in this situation, who was making a great contribution to the fundamentals of science. He then presented Doctor Noble who described some of the important experimental work that he and his associates had been carrying on in the temporary laboratories. Doctor Noble's descriptions made evident the importance of these researches and their possible bearing on human welfare. At the conclusion of Doctor Noble's report, Professor Osborn enthusiastically endorsed the research work that Doctor Noble's department is carrying on and stressed the importance of continuing it.¹¹⁹

Shortly after the above endorsement, Director Sherwood suffered a massive heart attack and Andrews became Acting Director on March 15, 1934 (Director on January 7, 1935). Compare the passage above with the following change of attitude in only 11 months (November 1934):

Status of Doctor Noble

Doctor Andrews briefly explained the situation in the departments of Experimental Biology and Herpetology, of which Doctor G. Kingsley Noble is Curator. He informed the Trustees that during the past eight years, including the five years of Doctor Noble's contract with the Museum, which terminated in 1933, the two departments have received \$241,904.00. *He said that in the opinion of the administration, Doctor Noble's work, specifically the Department of Experimental Biology, has been disproportionately developed at the expense of other equally important Museum scientific departments* [emphasis added]. He also stated that Doctor Noble's remuneration is \$2,000 in excess of the maximum salary paid to other Curators and that the annual allowance for the combined departments is \$6,000—approximately ten times the allowance for any other scientific department.

There ensued discussion of the advisability, in the process of adjusting and leveling Museum salaries, of reducing Doctor Noble's compensation to \$6,750, the curatorial rate. Such reduction was recommended by the administrative officers present on account of their opinion that Doctor Noble's compensation should not exceed that of other Curators of comparable scientific attainments, administrative ability and departmental responsibility.

The President was not convinced of the wisdom of such drastic reduction at this time, when strong efforts are being made to enlist the financial support of educational foundations to carry on and expand the experimental biology work.

Mr. Dodge cited the possible moral obligation which the Trustees have to continue the development of Doctor Noble's department, continuing the actual contractual obligation which has expired. The Acting Director pointed out that the reduction in Doctor Noble's compensation would not curtail the activities of his staff inasmuch as it was recommended that the \$2,000 reduction be applied to the salary of an Assistant Curator of Herpetology, a position which Doctor Noble has previously urgently requested.¹²⁰

No action was taken on the salary reduction, but mention of using part of Noble's salary for the needed Assistant Curator was probably misleading to the trustees. Although Noble periodically requested additional staff, Andrews, in the minutes of the same meeting

informed the Trustees of the advisability of further retirements and dismissals to improve the effectiveness of Museum departments and referred particularly to . . . [Assistant Curator] Clifford H. Pope [and five others].

If Assistant Curator Pope (then earning a respectable \$3000 per year) was to be dismissed (not retired), why would Andrews have needed to reduce Noble's salary by \$2000 in order to hire a new assistant curator more to his liking? Andrews' attempt to dis-

lodge Noble was to be unsuccessful. Pope was another matter.

Events moved fast in 1935. President Davison wrote to Cleveland Dodge, an influential trustee, in January:

Dear Cleve:

Roy Andrews tells me that he has talked with you three or four times about the Pope problem. Pope, apparently, is a good field man and a good research man. Our experience with him, however, has demonstrated the fact that he is not effective in departmental work and we have reached the point where it seems that we simply cannot afford to keep him on, doing the kind of work for which he is fitted and for which we would like to use him if we had the money.

Nobody here relishes the idea of letting him go, but we seem to be up against the same old question of the availability of funds, and if you have any suggestion about this please let me know as we would all be anxious to find a happier solution.¹²¹

Pope was scheduled to be dismissed from Herpetology at the end of April 1935. On March 20, Noble wrote the following letter to the new Vice-Director and Executive Secretary:

Dear Mr. Faunce

Following our conversation in regard to Clifford Pope, I am hoping that some arrangement may be made for his staying on in the Museum.

From 1921 until 1924 Pope served as a member of the Central Asiatic Expeditions. He returned to the field in 1925 and worked in Fukien until 1926. In 1928 he was appointed assistant curator of Herpetology which post he has held until the present time. During his stay of seven years in the Museum he has worked almost entirely on Asiatic material except during seven months of 1930 when he took an active part in rearranging the general collections of the Department. For the last three years Pope has been relieved of all departmental duties of every description in order that he might complete his report on the reptiles of China.

Very soon after Pope was appointed to the staff we began to realize that he lacked the cooperative spirit essential for a curatorial position. To take only one recent example of his attitude, I might mention that all the illustrations for his final report were sent to the engraver without departmental sanction or even knowledge. Such a procedure is of course contrary to Museum rules.

In 1931, Pope resigned from the Museum to accept a position in China, but when circumstances at the last moment were unfavorable he gave up the plan and returned to the Museum to complete his report on the Chinese reptiles. Ever since this resignation and reappointment, I have assumed that Pope would return to China as soon as his report was completed.

At the present moment no position is available to Pope in China or in any Museum. Forcing him to leave the Museum will produce an extremely unfavourable

vorable impression among our colleagues in other Museums. It seems to me that he should be allowed to continue as a research worker during the remainder of the year. After all, most of the other scientific departments of the Museum have curators with only research duties. For many years the Department of Herpetology has had such curators. Why should it now be stripped of all research workers while other departments are permitted to retain them? I hope because of the long Museum association of both Mr. and Mrs. Pope,¹²² that arrangements may be made for him to continue in his present capacity during the remainder of the year. In view of the recent resignation of Dr. and Mrs. Hatt from the staff, could not some adjustment be made which would give Pope the two thousand dollars necessary to carry him at his present salary to the close of the year?¹²³

There was no written response to this appeal, and although Pope was released from Herpetology on April 30, 1935, William K. Gregory requested (probably in consultation with Noble) and received permission to use a vacated 1935 salary line in one of his departments (Comparative and Human Anatomy) to hire Pope part-time in another one (Ichthyology).¹²⁴ Gregory also urged that Pope be appointed Assistant Curator in the Department of Central Asiatic Exploration and Research, where

[Pope could] collaborate with others in work on recent Asiatic fishes and he could assist in preparing the volumes on fossil reptiles and recent mammals, besides contributing other articles to the *Bulletin* dealing with problems in herpetology and ichthyology. P.S. I have discussed the matter with Granger and he strongly endorses the idea.¹²⁵

That suggestion seemingly was not thought feasible, but Andrews asked Gregory for an evaluation of Pope's immediate research plans, and Gregory responded on July 19:

Dear Dr. Andrews:

In response to your question, after careful consideration I am of the opinion that a separate volume on the Amphibia of China could and would be not a mere rehash of the subject but a constructive, very much used work.

The preliminary reports on the Amphibia treat only the immediate specimens collected and should be oriented to Chinese Amphibia as a whole. The volume on the Amphibia would therefore bear the same relation to the preliminary reports on the Amphibia as the reptile volume does to its preliminary reports.

Nevertheless the departmental, financial and personal adjustments involved look very difficult.

A few days later, on July 25, Director Andrews wrote to trustee Cleveland Dodge:

I am still wrestling with the extremely difficult problem of Clifford Pope.

Doctor Gregory, Curator of Fishes, had some money on which he agreed to take Clifford for half time up to the first of January to do some work in the fish department. Clifford still has the part of his book on amphibia which is not written. Doctor Gregory said that he would let Pope work on the amphibian volume up to the first of January instead of doing his fish work. This is very generous of him. Pope says that it would take him something over a year to finish the volume. We have no money in sight to carry him on after the first of January until the volume is done. Judging by the speed with which he worked on the other book it will take him more than a year.

Have you any suggestions as to what we had better do? I confess that I am completely at a loss. *I have talked several times with Noble. He reiterates that while Pope is a good research man, that to take an administrative job in the department he would be perfectly hopeless. I agree with Noble thoroughly in this respect and so does Doctor Gregory* [emphasis added]. However, Pope is a very good straight research man. If we had the money we would love to put him off in a corner and let him do nothing but research, but we haven't the funds for it.

Do tell me your thoughts on the matter.¹²⁶

Dodge responded on July 27 that he would find out if any of Pope's relatives could make a contribution to research work and would like to know the amount of money required for 1936. Andrews answered on July 30 that

Twenty-five hundred dollars would doubtless carry Clifford Pope for one year. He was receiving three thousand but that was higher than some of the other assistant curators and he has told me that he could get the book done in a year.

Again, nothing came of this idea. In November 1935, Noble recommended to Andrews that

As a budget in Herpetology for 1936, I would like to recommend that last year's budget be continued during the coming year *with the addition that Mr. Pope be returned to the Department at his old salary of \$3000* [emphasis added].¹²⁷

Museum payroll records, however, show that on December 31, 1935, Pope was again "laid off" for the second time that year. There is no record that subsequent thought was given to rehiring Pope, although funds for a replacement were available by the end of 1936. Pope's dismissal occurred at the end of the year in which his impressive *Reptiles of China* had been published, and it meant that the companion volume on Chinese amphibians was never to be completed. Pope was to turn to the writing of popular books and a later

curatorship at the Field Museum of Natural History (Bogert, 1975). He died in retirement in 1974.

An unanswered question is whether Pope ever knew the reason for his firing, or whether he fell in with the gossip that laid the blame on Noble, who, so far as I have seen, did not discuss the matter in correspondence outside the Museum. If Pope himself blamed Noble, much perhaps would be explained about his friend K. P. Schmidt's unexpected animosity toward Noble and Bogert's later misunderstanding of the reason for Pope's dismissal. Robert F. Inger, a colleague of both Pope and Schmidt, said that he could shed no light on the subject, and that he had never heard Pope discuss it.¹²⁸

The intention to dismiss Pope had been privately discussed at various times by President Davison, Director Andrews, Vice-Director Faunce, curators Noble and Gregory, and trustee Cleveland Dodge, as well as at Board of Trustee meetings, where most of the conversations were off the record. There is of course no way to recover these conversations. Reading between the lines in the paper trail discussed above, however, I conclude the following: (1) Noble lost influence when Roy Chapman Andrews became Acting Director and then Director. Noble's previously highly regarded operation in the Department of Experimental Biology was considered too expensive by Andrews. (2) Andrews wanted to reduce Noble's power by relieving him of administrative charge of the Department of Herpetology, preferably by appointing someone else as full curator or at least promotable to that rank. Andrews recognized normal operating procedure when he wrote that curators "should have entire charge of the operating and development of their departments and the exhibition halls for which they are responsible, in consultation with the Director."¹²⁹ (3) Pope was regarded by everyone (including William K. Gregory fide Andrews) as an unsuitable candidate to take administrative charge of Herpetology. (4) The fiscal situation was so severe that Andrews could not hire an additional curator even had he wished to do so. (5) Pope's research ability was highly regarded by everyone, including Noble, but this was secondary in Andrews' priorities. (6) Noble never

showed any desire to relinquish administrative control of Herpetology and therefore had no reason for recommending Pope for that post, but he did try to keep Pope in the Department. *There is no evidence whatever that an administration unsympathetic to Noble somehow conspired with him to dismiss a curator who had aroused his "ire" or "jealousy."* (7) Human nature would ensure that many of Noble's contemporaries would themselves have been jealous of his success and prestige, and their resentment would have been naturally reinforced by Noble's curtness. (8) It was this resentment passed down by some of Noble's contemporaries that has fueled the growth of uncomplimentary rumors that acquired a life of their own and which occasionally find their way into print.

An example of literary rumor-mongering was Hellman's (1968: 200–201) statement that "according to some, the Kammerer tragedy killed [Noble]," although Hellman did not identify the "some" or bother to learn that it was a chronic throat infection that led to Noble's death 14 years after that of Kammerer. Noble was subsequently depicted by Koestler (1971: 14, 98) as a "ruffian" and part of an "inhuman Establishment" for his role (Noble, 1926i, 1926j) in exposing an early instance of scientific fraud, which was followed by the suicide of Paul Kammerer (who had denied culpability). (See Aronson [1975] for discussion of the Kammerer affair and a critical commentary on Koestler's book.¹³⁰)

In returning to Pope, his dismissal in 1935 is hard to comprehend six decades later at the American Museum, where curators are now effectively tenured and are judged first on the quality of their research and secondarily on their performance in many other duties, including administration and exhibition (Nicholson, 1974). Important to note, however, is that Pope's original hiring as a field assistant had political overtones and that it never was intended for him to take on curatorial responsibilities or even to conduct research on the Chinese collections, as discussed later (under Andrews and Pope in China). Although Pope did prove to all that he was a qualified researcher, Roy Chapman Andrews, once in the Director's office,

seemed more interested in administrative ability and exhibition and less appreciative of research as an ongoing process. It now seems astonishing that research could have so quickly become secondary in the eyes of the Museum administration. But this new examination of Pope's dismissal substantially agrees with Kennedy's (1968: 227–237) conclusions about Andrews' effectiveness as Director of a collection-based research museum:

During the seven years Roy Chapman Andrews was Director the Museum, in the words of Clark Wissler [see Wissler, 1943?], "drifted badly." Andrews had no policy or program; he settled each problem as it came up, by choosing the "easiest way." He made little effort to help the scientific departments . . . In conversations with the trustees, he took the position that in view of the Museum's decreasing income, the trustees must soon choose between supporting scientific research, or aiding public education in the form of exhibits such as the habitat halls. After 1935 he began to talk about the need for a serious reorganization of the Museum and the abandonment of useless collections.

This gloomy assessment of the directorship under Roy Chapman Andrews should in no way be allowed to diminish his reputation as an extraordinarily gifted expedition organizer and leader. Hellman (1968: 171) got it exactly right:

The Museum's most celebrated staff explorer . . . was a striking victim of the not unfamiliar process whereby a valuable museum field man or indoor researcher is turned in middle life into a somewhat less valuable administrator.

The Museum continued to drift, and Andrews was forced from office in 1941, six years after the firing of Pope. Ironically, the instrument of his own disposal was a herpetologist.¹³¹

The termination of Pope's research career at the American Museum in 1935 was a setback for the Department of Herpetology, which already was weakened by Noble's preoccupation with the separate Department of Experimental Biology. Noble was to stay preoccupied, until his death five years later in 1940, and new fiscal crises and a new Director with idiosyncratic views were still to come. Herpetology nonetheless was to survive, even flourish, by sheer dedication of purpose in the form of Pope's successor.

ERA OF CHARLES MITCHILL BOGERT, 1941–1968

Noble's correspondence with C. M. Bogert (fig. 13)¹³² dates from 1931, with Bogert sending live specimens to Noble and borrowing material (through Prof. Raymond B. Cowles) for his own research. On March 20, 1935, Bogert wrote to Noble applying for a position, "having been informed that one of your staff is leaving." The news about Clifford Pope's imminent departure was fast travelling, since Noble that very day was writing a letter to Vice-Director Faunce trying to keep Pope at the American Museum! Noble responded on May 6 that "there will be no new money for herpetology during the remainder of the year." Cowles pursued the matter on behalf of his student Bogert in October 1935, and Bogert wrote again in March and in September 1936, but Noble still lacked approved funding as of October 9, 1936.

Finally, on November 17, 1936, three months after Assistant Kauffeld's resignation and nearly a year after Assistant Curator Pope's termination, Noble wrote to C. M. Bogert at the Department of Zoology, the University of California at Los Angeles:

Dear Bogert

We have often discussed the possibility of your coming east to continue your herpetological work. At the present moment we have need of a general herpetological assistant but the funds available are very limited. Would you be interested in joining our department in the capacity of temporary assistant for a period of 4 months . . . ?

I regret that this fund would barely pay your fare from and to California and keep you alive while you are here. You would, however, have the opportunity of becoming acquainted with the Museum and with living conditions in this vicinity. We would expect you to handle the usual routine of receiving, cataloguing and identifying herpetological material. Time would not permit your working up any large collection but some of our unidentified material from Mexico would be available to you for report.

It would not be advisable for you to attempt to bring your current problems east with you because the routine here should take all of your time.

Although this is not the position either you or I had in mind, I hope you will find it convenient to join our laboratory group for these winter months. May we expect you early in December?¹³³

Bogert was eager and not about to be indecisive at this stage. He arrived a few weeks later. Museum payroll records show that he

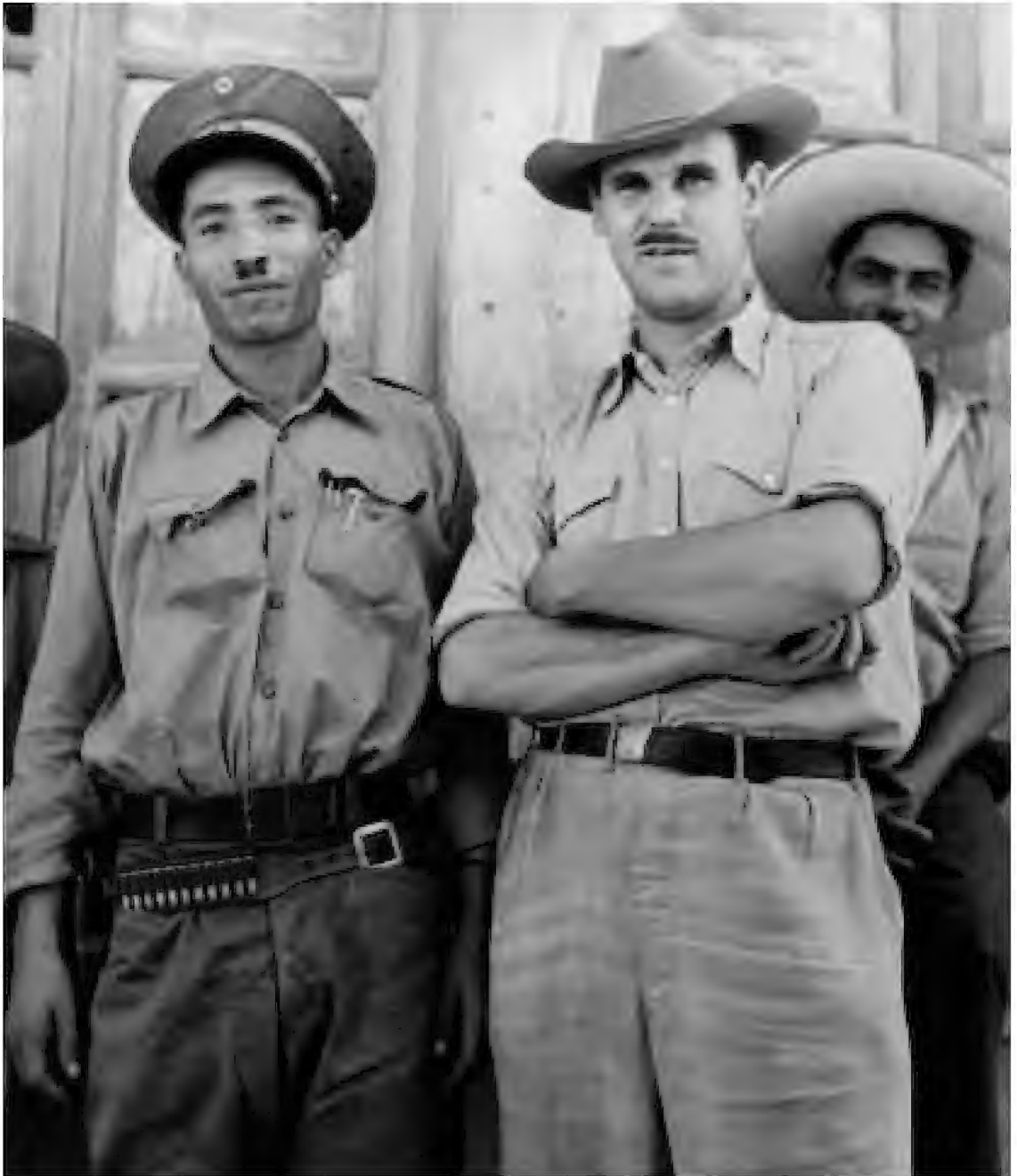


Fig. 13. Charles Mitchill Bogert (1908–1992) in the field (November 1939) at Acaponeta, Nayarit, with a Mexican soldier assigned as escort by the Governor of Nayarit. Bogert had been Assistant Curator in the AMNH Department of Herpetology for less than three years when he initiated Mexican fieldwork that would continue intermittently until his retirement in 1968. AMNH Dept. Herpetology Archives.

started as Assistant in Herpetology on December 7, 1936, presumably as a replacement for Assistant Kauffeld. However, Bogert became Pope's successor a few months later, in early 1937, when he was promoted to Assistant Curator:

The Vice-Director recommended the permanent appointment of C. M. Bogert, M.A., who was engaged . . . on a trial basis as Assistant Curator [but hired as Assistant] in the Department of Herpetology and whose services have been eminently satisfactory. Provision was made in the 1937 budget for this permanent position.¹³⁴

The year 1937 had shown an improvement in the Museum's finances, allowing it to return contributions that employees had made in 1936 towards operating expenses, to give some raises, and to hire Bogert. Even so, conditions were to deteriorate again, and with Noble's attention mostly in Experimental Biology, Bogert was to run day-to-day operations in Herpetology with little help from salaried staff during the late 1930s and early 1940s.

In 1937, Assistant Curator Bogert had two assistants and partial use of a secretary (who was shared with Experimental Biology and with trustee Douglas Burden¹³⁵) to help run Herpetology affairs. One of the assistant positions (A. Schmidt) was transferred to Experimental Biology in the following year, and the second position (last occupied by R. Snedigar) was lost a year or so later. Herpetology was financially starved during those years; for example, the Herpetology operating budget (excluding salaries) decreased from \$925 in 1939 to \$325 in 1941. Bogert had only a secretary on the salaried staff in 1940 and 1941,¹³⁶ although several part-time WPA workers were available until May 1942.¹³⁷ As he fought for the departmental budget in 1942, Bogert summed up the situation as follows:

First, it must be borne in mind that the growth of the Department, especially during the last decade, has not proceeded along what might have been normal lines. Whereas collections continued to come in from expeditions, there was no corresponding increase in size of the Staff. The Curator [Noble] during this period, for quite understandable reasons, strove to build up the size of the collections, but owing to the financial stress of the period found it necessary to curtail the scientific staff in one department [Herpetology] under his jurisdiction in order to build up that in the

other department [Experimental Biology] in which he was more vitally interested . . .

Any further revision of the departmental budget should, therefore, be considered in the light of the drastic reductions that have already been made during the preceding years; contrast of this year's budget with the temporary budget of last year is neither significant nor fair.

Operation during the last five years, with collections steadily growing in size . . . has been carried on with the extremely useful, but inadequately trained, assistance provided by the Works Progress Administration . . . [Their] tasks can be carried out by a worker without a reasonable amount of biological training only if he is constantly and meticulously supervised [by Bogert] . . .

It seems clear that the nature of the budget [for 1942] submitted by me was misconstrued. Had I proposed a budget for normal times it would have included recommendations that no less than two Assistant Curators be added to the staff, with the addition of a general assistant paid by the Museum to replace the WPA assistant who may be lost at any time. And still such a proposal would have been requesting only the staff, never the maximum requirement, that existed in the Department a decade ago!

The Budget Committee has asked me to consider what they have set up as a war-time budget, entailing the deferment of the proposal to hire an additional trained man. This, I submit, is more than a reduction from a war-time budget . . . the alternative I present below is offered only as a partial, and improbable solution. It should not be considered except in the light of more extenuating financial circumstances than now appear to exist.

. . . if there must be any serious reduction in the staff as proposed in my 1942 budget, it should not be in the scientific staff. An assistant curator should be added even at the expense of sacrificing the services of a secretary.¹³⁸

Bogert kept his secretary and also got his new salary line for an Assistant Curator, possibly with unexpected help from the 1941 Ruthven Report (see notes 4, 131), which had been written for the trustees and which had mentioned the Entomology and Herpetology departments as being "clearly understaffed." The person selected by Bogert was James Arthur Oliver (fig. 14), who was appointed Assistant Curator for

a trial six months period, beginning May 1, 1942 . . . [but] in the event you are called for military service during your six-months' trial period, you will not feel that the Museum is obligated to you in any way as regards subsequent employment.¹³⁹

Oliver did go to war, from 1943 through 1945, serving as Communications Officer on a Navy destroyer, but his place at the Mu-



Fig. 14. James Arthur Oliver (1914–1981). This photograph was taken in February 1948, only a few months before Oliver tendered his resignation as Associate Curator; he was to return to the American Museum in 1959 as Director. AMNH Photographic Archives 299471.

seum was secure, at least through the war years.

Meanwhile, Roy Chapman Andrews had been asked to resign in 1941, and the new Director, Albert Parr, started the following year, about the same time as Oliver. Although a systematic ichthyologist, Parr never embraced the “New Systematics” (Huxley, 1940). He lacked vision for his own discipline and believed that ecological zoology was more important than collections, particularly fossil ones. Parr quickly did the unthinkable in the year following his appointment—he dissolved the Department of Vertebrate Paleontology, an action which amounted to a repudiation of over a half-century of exploration and research in a department that was the embodiment of Osborn’s long presidency.

Rainger (1991: 245) mistakenly seems to have thought that Director Parr was “the new museum president” and simplistically concluded that Parr’s administrative decision “was a reaction to the excesses of the Osborn era.” However, Osborn’s successor, President F. Trubee Davison, had been in office for nearly a decade and, unlike Osborn, seems to have given his directors (Parr being the

third) a fairly free hand. Considering Parr’s views on collections (see later), the temporary combining of the paleontological and neozoological departments more likely was a misjudgment on his part rather than a reaction to anything.

George Gaylord Simpson protested to Parr in direct conversation and in a 4-page letter, of which a small portion follows:

... to tell a paleontologist that this department is to be discontinued is almost like telling him, that the end of the world has come ... its passing—whatever is done with its collections and personnel—will be a sad historic landmark.

... There is, however, a very good reason why paleontology has been here and everywhere almost always been handled as a separate unit. A museum is a working institution. Partially excepting fossil fishes, the study of which has special problems and is moribund in this museum anyway, the actual work of vertebrate paleontology is practical identical throughout, collecting, preparation, mounting, conservation, and technical study, for fossil amphibians, reptiles, birds, and mammals. For the actual operations of a museum and research center, paleoherpetology and paleomammalogy have much more in common than either one has with its corresponding neozoological specialty.

... This is no time for concealing even quite personal reactions and I shall be entirely frank about an aspect of the matter that is seldom discussed for fear of appearing, or of being, petty ... I was definitely promised that I would immediately succeed Granger as Curator of Fossil Mammals and Granger and Brown as head of this department when the occasion arose ... This plan is such a complete surprise for me that I have not had time to digest the situation thoroughly ... ¹⁴⁰

Nonetheless, Parr rushed through with his plan, later explaining that

it was decided to discontinue the artificial segregation between the palaeontological departments ... and those concerned with the living forms of today, and to combine them into larger departmental units defined only by the natural relationships of the organisms. The new title of “chairman” was introduced to designate the administrative head [previously “curator”] of each independent unit.¹⁴¹

Thus, the Department of Herpetology underwent another name change and the “Department of [all] Amphibians and Reptiles” was born, with Edwin H. Colbert, Chairman and Acting Curator of Fossil Reptiles, and C. M. Bogert, Acting Curator of Recent Amphibians and Reptiles. This was a promotion for Colbert, who enthusiastically accepted the new position as chairman:

Dear Mr. Parr:

It gives me great pleasure to accept the position of Acting Curator of Fossil Reptiles, as offered to me in your letter of June 26th. I understand that in accepting this position I will also act as Chairman of the new department of reptiles and amphibians, and will assume the responsibility for the policies and the proper conduct of this department. As I told you in our conversation of this morning, I sincerely hope that I will be able to justify the trust you have placed in me, by appointing me to this new position, and I will do everything in my power to cooperate with the members of this department and with the administration for the successful operation of the new plan.¹⁴²

Years later, however, Colbert (1989: 250) seems to have remembered it quite differently:

Simpson and I opposed this reorganization with all of our power, but for the time being Parr prevailed . . . It was galling to Simpson and embarrassing to me, and eventually it proved to be unwieldy, as we all knew it would be. Fortunately for me Chuck Bogert accepted the situation with good grace, and we worked together harmoniously for the duration of this unrealistic arrangement. But in the meantime Simpson went off to war feeling very angry and disgruntled. (After the war the Department of Vertebrate Paleontology was reconstituted, with George Simpson as its chairman . . .)

Indeed, it did not take long to realize the administrative and curatorial folly of departmentalizing dinosaur bones with pickled newts, and in 1944,

All the Museum's collections and activities in the various branches of the geological sciences, from mineralogy to vertebrate paleontology, have thus been combined in a single Department of Geology and Paleontology, corresponding to the usual organization of these subjects in colleges and universities.¹⁴³

Parr had come to the American Museum after having served as Director at the Peabody Museum, and he presumably felt confident in his judgment about such things. Apparently there was little initial consultation with the scientific staff. Curator Richard Zweifel (hired in 1954) remembers Parr as keeping the staff at a distance, especially as compared with the two directors following:

A significant difference between Parr and Oliver (and especially Nicholson) was in communication with the curators below the level of Chairman. I can recall being in his office only once in the five years between my arrival and Parr's retirement—a formal appointment he allocated to Assistant Curators in their initial five years.¹⁴⁴

Perhaps this distance from his staff prevented

Parr from acquiring a greater sense of the importance of the Museum's collections. Admittedly Parr had to grapple with grave budgetary problems, but one of his solutions—divestiture of some collections and limitation of others—if fully enacted, would have forever changed the Museum. In a Confidential Report and Recommendations, Parr stated:

The possession of large research collections puts the Museum under a responsibility to the entire scientific world. This responsibility can only be dissolved by donating the critical portions of these collections to other institutions better able to give them the proper use and care, if an adequate staff cannot be provided in our own organization . . . in the subjects of Fossil Invertebrates and Mineralogy one must therefore give serious consideration to the possibility of passing the responsibility . . . to other institutions.

In regard to Fishes and Living Invertebrates a definite policy of not accumulating permanent research collections beyond current reference needs . . . must be firmly adopted. A limitation of scope of permanent collections in Archeology, Living Reptiles and Amphibians, and Insects must also be adopted and adhered to.¹⁴⁵

That was in 1944, but Parr seems to have kept the idea alive at least up to 1947, when Bogert complained that

I dislike the Director's arbitrary methods . . . Parr still has a very rudimentary notion of what our department consists of, or the importance of our collections. In fact he is renewing his arguments that "private" museums, as he considers ours, should not be burdened with huge collections, and that this is the function of government supported National Museums! Seemingly he believes that when a collection has been reported on in a faunal study that its value is from then on limited. The latest rumor is that, to save money, we shall be asked to dispose of all our collections except those needed for educational or exhibition purposes!¹⁴⁶

Although the collections were retained, the growth at least of the ichthyological and invertebrate collections was in fact curtailed when, in 1944, Parr reorganized the Department of Fishes to include invertebrates under a new Department of Fishes and Aquatic Biology. Charles M. Breder was hired as Chairman. Breder earlier had proved to be a good collector not only of fishes but also of amphibians and reptiles (see Breder in Darién Jungles, under Some Early Department Fieldwork), but he was not a collection builder and therefore fit in with Parr's philosophy. The herpetological collections, on the other hand, continued to grow and to be

curated as well as possible under Bogert's chairmanship.

Bogert's Assistant Curator, James Oliver, returned to the Museum from military service in January 1946 and was promoted to Associate Curator effective July 1, 1947. Oliver prepared his dissertation (a generic revision of snakes now known as *Leptophis*) for publication while at the Museum and he worked well with Bogert, with whom he collaborated on a paper on the herpetofauna of Sonora. Oliver published on the relationships of anoles on the island of Bimini, where he conducted fieldwork during the summer of 1947. He had planned further work on the Museum's West Indian collections, but Museum finances deteriorated and Oliver found his position to be intolerably insecure. Parr had succeeded in establishing a career schedule for promotion and salary increases, but he also had been obliged by the trustees to set a minimum staff level for each department, and Oliver found himself outside the "irreducible minimum"¹⁴⁷ assigned for the Department of Amphibians and Reptiles. Oliver resigned after receiving an offer of an assistant professorship from the University of Florida at Gainesville. He wrote:

Dear Dr. Parr:

. . . In view of the uncertainty concerning my position on the staff of the Museum and in view of the many opportunities presented by the Florida appointment, I shall resign from my position . . . effective June 15, 1948. My association with the American Museum of Natural History has been one of great pleasure and profit to me . . . I consider myself especially fortunate to have worked with Mr. Charles M. Bogert whose friendship I cherish and whom I hold in the highest professional esteem . . .

Parr responded as follows:

Dear Dr. Oliver:

It was with extreme regret I received your letter of resignation of April 20, but in view of the fact that we are not able to give you any definite assurances about the future of your position here on account of our financial difficulties I can perfectly well understand the decision you have felt necessary to make . . . We shall all miss you very much both as a person and as a scientist, and consider it extremely unfortunate that we are not able to offer any assurances of continuity in the positions which are beyond the number which has, rightly or wrongly, been established as the absolute minimum requirement for the Museum. You know the size of our deficit and so does the world I'm afraid . . .¹⁴⁸

With Bogert's encouragement, Oliver returned to New York in 1951 as Curator of Reptiles at the Bronx Zoo, of which he also became Director in 1958. Then, in 1959, he succeeded Parr as Director of the American Museum, holding this post until 1969. He subsequently was Director of the New York Aquarium from 1970 to 1976. He died in retirement in New York on December 2, 1981.

Papers attributable to Oliver's curatorial work at the Museum include all the research citations in the References section (Oliver, 1943–1951; Bogert and Oliver, 1945). Two later papers cited (Oliver, 1963, 1970) were written on behalf of the Museum while he was Director.

As Director, Oliver brought a renewed commitment to systematics at the American Museum and substantially strengthened several departments, including Ichthyology, which was returned to departmental status, and Herpetology, which was to receive a third curatorial position by the end of his directorship. And there was an end to talk of collection divestiture!

Except for Oliver's earlier very welcome but short-lived service in a curatorial position (a total of about 3½ years in the period 1942–1948), Bogert was the sole curator in Herpetology from 1940 to 1954. After Noble's death, Bogert became, successively, "Assistant Curator (In Charge)" of the Department of Herpetology (1941), "Acting Curator" (1942) and "Curator" (1943) of Recent Amphibians and Reptiles, and "Chairman and Curator" of the Department of Amphibians and Reptiles (1944–1958) and of the Department of Herpetology (1959–1968). He was to hold the chairmanship until he resigned it effective June 30, 1968, because of his pending retirement on December 31 of that year.

In the years between 1940 and 1969, the collection under Bogert's direction grew by 67 percent, from approximately 110,000 specimens to about 184,000 catalogued specimens. Except for curatorial field trips, the Department no longer had the ability to finance expeditions by its own collectors, as in the time of Dickerson and Noble, although material kept coming in from other Museum expeditions. Bogert, however, made a series of appointments of Research Associates that

serendipitously resulted in the Department receiving extremely valuable collections from its own honorary staff.¹⁴⁹ Archie F. Carr, Roger Conant, Carl Gans, Sherman A. Minton, John A. Moore, and Janis A. Roze are among the Research Associates who owed their initial appointments to Bogert and who benefited the Department's acquisitions.

Bogert produced a distinguished body of research during his 32 years at the Museum. Both his descriptive and experimental work have been widely acclaimed, as for example by K. P. Schmidt (1955: 614), who observed that "Bogert has happily continued the tradition of a welding of experimental and anatomical techniques into a 'new systematics.'" Bogert's taxonomic and morphologic interests ranged broadly over lizards and snakes, with occasional forays into salamanders and anurans. He collected extensively in North and Middle America and made one trip to Ceylon. Much of Bogert's field and laboratory work was aimed at gathering data on living amphibians and reptiles. He was a pioneer in the investigation of thermoregulation in the ecology of reptiles (see Pough, 1974). Later, he was among the first zoologists to take advantage of a new instrument, the sound spectrograph, an outgrowth of research at the Bell Telephone Laboratories (Koenig et al., 1946). Bogert's field recordings and laboratory analyses resulted in a major summation (Bogert, 1960) that greatly stimulated the use of bioacoustical data in behavioral and systematic studies of amphibians and reptiles.

Herpetology at the American Museum owes much to Bogert, who held the collection together as a relatively well-curated unit during a long period of acute economic stress and understaffing. After retirement at the end of 1968, Bogert moved to Santa Fe, New Mexico, where he died by his own hand on April 10, 1992. (See Myers and Zweifel [1993] for a biographical sketch of Bogert, as well as his bibliography.)

R. G. ZWEIFEL AND SUCCESSORS: SECOND HALF OF THE 20TH CENTURY

It is not my intention to seriously extend the analysis of departmental development

and curatorial staffing into the realm of the living—but neither can I ignore nearly half a century of recent history. Therefore, the following account is purposely brief and aims only at giving sufficient perspective to other late-century aspects of the curation, exhibition, and growth of the herpetological collections. The essential outline of this era is well documented in the Department's annual archival reports.

After Oliver's resignation as Associate Curator in 1948, six years were to pass before a second curatorial position was again granted to Bogert. He chose a young man who had taken one of his summer courses at UCLA in 1947.

Accordingly, Richard George Zweifel (figs. 15, 59) started as Assistant Curator on July 1, 1954, becoming Associate Curator in 1960 and Curator in 1965. In his 35 years at the Museum, Zweifel developed a varied research program (see appendix 4 for bibliography), including studies of critical thermal maxima of salamanders, temperature adaptation of anuran embryos, influence of temperature on frog calls, genetics of color-pattern polymorphism in kingsnakes, and long-term studies of the dynamics of small populations of toads (unpublished) and painted turtles. He never forgot, however, that he was a curator and that a good zoological curator is a systematist. Zweifel's long series of carefully crafted taxonomic papers richly reflected his familiarity with the animals in life. His most productive fieldwork was carried out in the American Southwest and in New Guinea and Australia, but he also contributed valuable material from other places, including Mexico, Nicaragua, Panama, and Venezuela.

Following Bogert's retirement, Zweifel served 12 years (July 1, 1968–June 30, 1980) in what changed to a rotating chairmanship during his tenure.

I joined the staff as Assistant Curator in June 1968, as Bogert's replacement, becoming Associate Curator in 1973 and Curator in 1978. My half-year overlap with Bogert marked the third time that Herpetology had been briefly staffed with three curatorial positions at once (the other times being a few months in 1920, with Dickerson, Noble, and Schmidt,¹⁵⁰ and 12 months in 1929–1930, with Noble, Pope, and Burt). Three curatorial



Fig. 15. Richard G. Zweifel inspecting an exhibit in progress, September 1977. AMNH Photographic Archives 67099.

positions were formalized for the Department when Charles James Cole came as Assistant Curator in 1969, with promotions to Associate Curator in 1974 and Curator in 1979.

Under Zweifel's guidance, the Department's long involvement with innovative exhibitions continued into this period. The elegant but old and dated herpetology hall was closed in 1968, and, in 1970, intensive work on a new exhibit began in collaboration with the Department of Exhibition. The *Hall of the Biology of Reptiles and Amphibians*, one of the most ambitious undertakings of its kind, opened to the public almost eight years later, on November 18, 1977 (see under A Century of Exhibition). During the 1970s the three curators collectively obtained support for some 30 expeditions and smaller field trips in a dozen or so countries on three continents plus the West Indies. These trips, in addition to acquiring specimens for the collection and data for research, provided fresh material for model preparations in the exhibit hall, which owes part of its flavor to the cu-

rators' fieldwork. Gifts, purchases, and fieldwork augmented the research collection during the 1970s by about 17 percent, and the collection was increased by an additional 17 percent in the period 1980–1990.

I served as Chairman from July 1, 1980, through June 30, 1987, at the end of which term Director Thomas D. Nicholson realized his philosophy of having more or less equal-sized departments by administratively combining Ichthyology and Herpetology.^{151,152} The then-current chair of Ichthyology, Gareth Nelson (fig. 16), became chairman of the "new" Department of Herpetology and Ichthyology, serving in that capacity until June 30, 1993. Like Bashford Dean (fig. 2), Nelson developed a benevolent approach to Herpetology, but, over the period of merger, both departments were in my opinion somewhat set back owing to loss of autonomy. Such tinkering usually seems to have been detrimental to collection-based units and to have created inefficiencies not anticipated by ad-



Fig. 16. Gareth Nelson, who chaired an administratively merged Department of Herpetology and Ichthyology from July 1, 1987, through June 1993. Nelson was the second ichthyologist to head a combined department, reminiscent of his predecessor of yore, Bashford Dean (fig. 2). Herpetology and Ichthyology were again separated in 1997. Photograph by Gary Grimaldi, 1994.

ministrators over the years (see also note 152).

Following Nelson, I accepted the chairmanship of the joint department effective July 1, 1993, with understanding that separation of the departments would be considered after several years.¹⁵³ Provost Michael Novacek made the decision for separation effective July 1, 1997. Thereafter, I served as chairman for the liberated Department of Herpetology until my retirement from active service effective January 1, 1999 (a few weeks after completing the manuscript for this paper).

With the department relieved of all but minor exhibition work by the end of Zweifel's chairmanship, my major administrative goals starting in 1980 became fairly straightfor-

ward: (1) to acquire financing for modernizing the sound laboratory and other facilities in Herpetology (the first AMNH department to place a computer at each curator's desk), (2) to build a stronger support staff and earn grant support in order (3) to move to an electronic database for collection data and loan invoices, (4) to establish the Herpetology Archives (which made this *History* possible), and, opportunistically, (5) to coordinate interdepartmental participation in several expeditions to the Venezuelan table mountains. These were the main goals, although later I also attempted to benefit Ichthyology by establishing parity with Herpetology with regard to support staff and annual budget.

After a long period of understaffing and economic crisis, Zweifel's era became a time

of steady improvement in curation of the herpetological collections, a trend that has extended through the 1990s. Zweifel initiated the series of National Science Foundation departmental grants that have made possible major improvements in the collection and bioacoustical facilities.¹⁵⁴

In 1995, the new professional position of Curatorial Associate was first created in the Museum in the Department of Herpetology. The object was to give the Department greater flexibility in all its professional activities and to bring more sophisticated management to

the newly computerized collections. The position was initiated with Linda Sherill Ford.¹⁵⁵

Zweifel retired to Arizona in 1989, where he continued his research at the Museum's Southwest Research Station. His replacement, Darrel Richmond Frost, was appointed to the position of Assistant Curator in 1990, with promotion to Associate Curator in 1995. In 1997, Frost also took on a new administrative term position as Associate Dean of Science for Collections, a position reflecting the Museum's renewed commitment to collections.

A CENTURY OF EXHIBITION, 1870s–1978

The questions have sometimes been asked: "Why conduct research? Why not concentrate on the marvelous exhibitions, which give people so much pleasure?" The answer, of course, is that the exhibitions are made stunning because the Museum has the knowledge and collections to support them. It would be inconceivable—to us—to mount an exhibition of any size without the authoritative scientific supervision of a Museum curator. (Director Thomas D. Nicholson, 1977, 108th Annual Report)

Although it was to take time for thoughts such as the above to be articulated, the Museum realized early on that if an educational mission were to be realized, it needed scientific expertise for displaying its growing collections. Departments were spawned, I believe, partly because of the desire to exhibit collections authoritatively.

Some bottled amphibians and reptiles almost certainly were on view in the 1870s, when probably part of the Maximilian and other just-acquired collections were displayed in the Arsenal Building in Central Park, before the first edifice (fig. 42) of the new Museum had been erected. Some few bottled and mounted specimens were likely displayed soon thereafter in the Museum's early halls in the late 1870s and early 1880s. By the late 1880s, "The crowded state of our collections in the exhibition halls entirely excludes those belonging to the Department of Reptiles."¹⁵⁶ Nonetheless, by 1888 there were available (even if not on display) in the exhibition collections 60 mounted reptiles, 200 alcohol-preserved reptiles, and 25 skeletons (Gratacap, 1900–1908, chap. 4: 33).

Completion of Building 3 (the wing of the

Museum that faces onto the eastern end of 77th Street; see fig. 17), which was called either the east wing or the southeast wing, allowed "four reptiles [to be] mounted and added to the Exhibition Collection" in 1900.¹⁵⁷ A few of these can be seen in figure 18, which shows a 1900 view of the second-floor East Wing Mammal Hall, at the western end of which a few mounted crocodilians are visible on the third-floor balcony level. The first guide to the exhibit halls (Am. Mus. Nat. Hist., 1904) mentioned that "The case in the southwest corner of this [second-floor] hall contains temporary specimens of fish and reptiles, including a 24-foot python."

By 1906, considerable activity was under way in exhibiting reptiles and some amphibians, as shown by news notes in issues of the *American Museum Journal*:

There has been placed on exhibition a group of Texas rattlesnakes, the material for which was collected by Professor [William Morton] Wheeler and Doctor Dahlgren on a trip to Arizona last spring. (Am. Mus. J. 6(1): 21)

Among groups which have been placed temporarily in the East Mammal Hall, No. 207 of the second floor, may be mentioned those of the Iguana, the large tropical lizard which was collected for the Museum in Sinaloa, Mexico, the great Texas Rattlesnake, which next to the Diamond Back is the largest and most dangerous of the poisonous snakes in the United States, collected near the mouth of the Rio Grande and the Mud-Turtle, representing a familiar inhabitant of the fresh-water marshes and ponds of the United States. Several snakes have been mounted and placed for the time being in the cases near by.

A plaster cast of the large Leatherback Turtle which was presented to the Museum last summer by

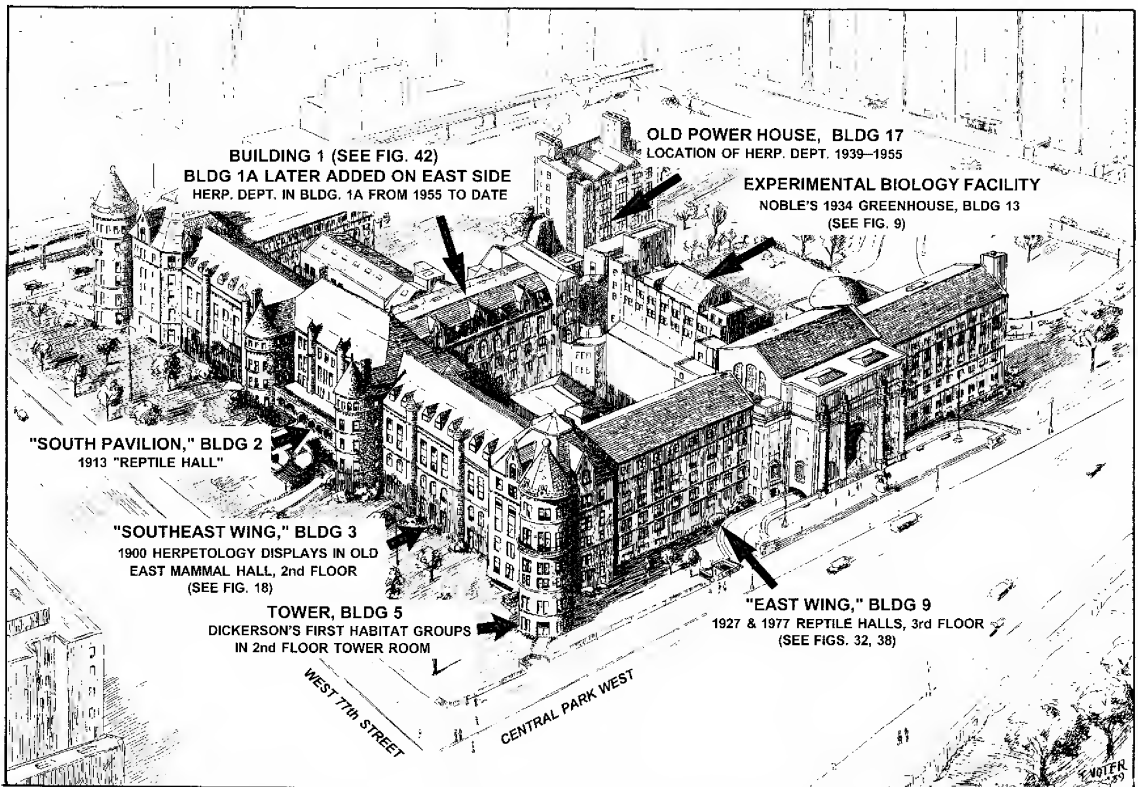


Fig. 17. Drawing of the Museum as it looked in 1939, indicating locations of various herpetology exhibits, department offices, and Noble's greenhouse. Building (section) numbers reflect order of construction. (The elevated subway tracks on the western side of the Museum, on Columbus Avenue, no longer exist.) AMNH Photographic Archives 322779.

Messrs. G. M. Long & Co. of New London, Conn., has been installed temporarily in the East Mammal Hall . . . The Leatherback is the largest of the Marine reptiles found in the vicinity of New York City. (Am. Mus. J. 6(2): 73-74)

. . . The tower room beyond the East Mammal Hall is devoted to reptiles and batrachians, particularly those of the vicinity of New York City, which are described in the two Guide Leaflets on those animals which have been issued by the Museum. (Am. Mus. J. 6(3): 116-117)

The first subjects mounted and put on display were attention-getters. But the exhibit featuring elements of the New York fauna denoted a more thoughtful educational theme, as also suggested by the appearance of published guide leaflets, which were written for the Museum by Raymond L. Ditmars (1905a, 1905b) of the Bronx Zoo.

It seems likely that exhibition needs were an important—possibly the most important—consideration in organizing an official De-

partment of Ichthyology and Herpetology in July 1909. The only one on the Museum staff who could be called a herpetologist was Mary Dickerson, based on her successful *The Frog Book* (1906) and the collection that she had made while working on the book. She was already involved in exhibition in her Department of Woods and Forestry and was about to publish her 104-page guide to the Forestry Hall (Dickerson, 1910a). Furthermore, she was a skilled nature photographer with an artist's eye for composition and she had an agile mind. According to Noble (1923n: 515-516)

She was always an independent and highly original thinker. To take but a single illustration . . . one day when mounting one of the water newts in the act of shedding its skin, her assistants found it extremely difficult to imitate the shed skin in wax, celluloid, or any other medium. When the matter was referred to Miss Dickerson, she suggested at once exactly the right thing—an onion skin.



Fig. 18. The year is 1900. This photograph gives the earliest glimpse of herpetological exhibits—mounted crocodilians on the third floor balcony, viewed looking west through an early mammal hall in building 3. The open ceiling has since been closed in order to obtain more floor space. AMNH Photographic Archives 353.

She was a happy choice to coordinate and initiate professional herpetology exhibits.

Dickerson threw herself immediately into the exhibition program, working directly with preparators of the time and doing some of the early wax casts herself.¹⁵⁸ Although attention was given to techniques of model making using clay and plaster (fig. 19), the Museum's preparators were especially experimenting with, and trying to perfect, the techniques of wax casting (fig. 20 et seq.). The process was of interest to Dickerson for making true-to-life flower reproductions in Woods and Forestry (fig. 22) as well as frogs and such in Herpetology. After hands-on experience, she was qualified to discuss the procedure (Dickerson, 1911c: 209, 211):

If the skin is thin and soft, which is true in most small lizards, many snakes and turtles and all amphibia, the animal is reproduced in wax, the wax used being pure bleached beeswax (which has a high melting point so that summer temperatures are not an enemy to the exhibits) with a small proportion of Canada balsam to make it less brittle and more easily worked. The dead animal may be posed from the living and a waste plaster mold or a piece mold made, from which a cast is taken in wax . . .

The advantage of making the casts in wax lies not only in a great susceptibility of this medium to take and retain fine detail, not only in a transparency which adds greatly to the lifelike effect in many amphibia, but also in a surface of such character that it takes oil color with an effect of life texture. Soft skin texture cannot be gained with a hard plaster surface. When a [large form] must be cast in plaster, the plaster surface is afterward sprayed with a coating of wax.



Fig. 19. Model-making in 1911. **Top:** An enlarged model of a frog mouth “for study of structures connected with eating, breathing and croaking.” A living frog is cooperatively posing for coloring from life. **Bottom:** Sculpting a giant Japanese salamander in clay, to be used as a model for casting in plaster. AMNH Photographic Archives 33403, 33405.

As she stressed elsewhere, the plaster molds for the wax casts were made from animals “posed in active positions from life” and “the final illusion has been given by coloring

[the wax] directly from living animals” (Dickerson, 1911d: 39). Live specimens were obtained from various sources, including her own fieldwork and especially loans and gifts



Fig. 20. An early aim of Dickerson and her preparators was to portray a synoptic series of the world's amphibians and reptiles, for which wax casting was used when possible. **Top:** Elegant 1911 wax casts of the European salamander *Proteus* [mistakenly called *Amphiuma* in Dickerson (1911c: 208), but correctly identified by her in an internal report dated March 13, 1911]; the gills were made of glass. AMNH Photographic Archives 33575. **Bottom:** A 1913 wax cast of American *Amphiuma means*, which lacks external gills. AMNH Photographic Archives 14879.

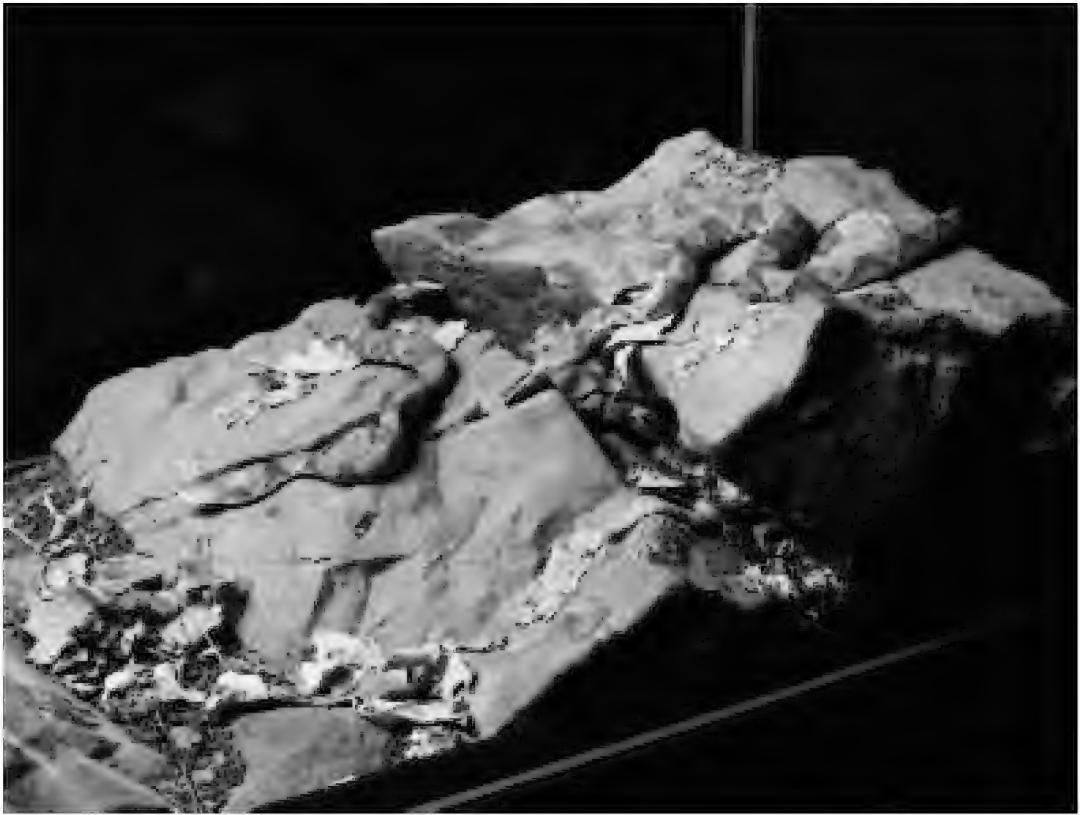


Fig. 21. The oldest surviving Herpetology exhibit: "Copperheads in the Palisades [New Jersey]," a study from life *circa* 1905. This small group was first mentioned in the AMNH Annual Report for 1905. However, according to Mary Dickerson's internal departmental report dated March 13, 1911, the snakes had "turned black, apparently 'gone bad' from the use of too much glycerine in the preparation." The original snakes were replaced in 1911 by these exquisitely painted wax casts (the tongues may be glass), which were posed exactly to replace the older specimens. This floor exhibit became case no. 12 in the 1927 Hall of Reptile and Amphibian Life (see fig. 31); it is the only one of the older cases not dismantled over the years. Photographed in the Department of Herpetology by Denis Finnin, November 1998.

of animals from Raymond L. Ditmars, Curator of Reptiles at the Bronx Zoo, and Charles H. Townsend, Director of the New York Aquarium.

Early on, in her annual report for 1910 (and archival drafts bound with the departmental copy), Dickerson outlined a plan for three kinds of endeavors in herpetological exhibition: (1) A synoptic series of amphibians (with 88 casts completed) and some reptiles, for which live material could be obtained, with the object of "setting before the visitor to the Museum the beginning of a collection of lifelike" amphibians and reptiles previously displayed only as

pickled specimens in jars. (The published report for 1910 [Dickerson, 1911d] shows a nicely painted plaster cast of a bushmaster and its eggs that was made from a specimen supplied by Raymond Ditmars.) (2) A series of skeletons "posed in life positions [to show] not only osteological facts but [to] also emphasize facts of popular interest, such as the spreading of the ribs to form the hood of the cobra." (3) "A series of habitat groups covering the herpetology of North America has been planned and work has progressed on three of the groups," with 87 casts having been made to that time.



Fig. 22. Mary Dickerson also was Curator of the old Department of Woods and Forestry. She consequently was involved in the forestry exhibits, as well as those in Herpetology. This 1911 photograph shows a group of unidentified young women taking notes on catalpa flowers, which are reproduced in wax. AMNH Photographic Archives 33603.



Fig. 23. A portion of Mary Dickerson's Bullfrog Group in 1911. The techniques for this first major group became the basis for subsequent groups. Among the abundance of detail, "Two frogs are engrossed in a chickadee on the birch branch above. The smaller frog seems likely to fall prey to a black snake ready to strike from the white azalea" (Dickerson, 1911c). AMNH Photographic Archives 33561.



Fig. 24. Another section of the 1911 Bullfrog Group, including one frog eating baby water snakes and another dashing from the water after a white-footed mouse (far right), while on the far left a perched turtle and observant dragonfly overlook the action. "*Sediment, water weed, pond scum, every item under water was a separate problem. The plants above are in their ecological order from the duckweed and lilies on the surface through the pickerel weeds to the higher alders and willows*" (Dickerson, 1911c). AMNH Photographic Archives 33563.

MARY DICKERSON'S HABITAT GROUPS

The greatest achievement of the department . . . has been the establishing, under the direction of Miss Mary C. Dickerson, of perhaps the finest series of reptile and amphibian habitat groups ever produced. (Noble, 1925f: 382)

A piece of original, complex, constructive work is always a delight in the doing and the designer will always hope that what has been put into it will be taken out by one or another who stands before it. To create the new group has come as an opportunity to give back in a small measure here in the heart of New York City what was received some years ago from an intimate acquaintance with the New England "wilderness." (Dickerson, 1915a: 166)

Dickerson's vision of habitat groups or di-

oramas devoted mostly to the exhibition of American amphibian and reptile life was a uniquely ambitious goal, toward which she and the Museum's preparators were to make considerable progress over the next several years. She was aware that they were breaking new ground:

The exhibition of amphibia and reptiles is beset with unusual difficulty and the various species have been represented in museums heretofore by alcoholic material more often than in any other way. After much experimental work, it has been found possible to make wax reproductions with fidelity to the living animal in form and color and also with lifelike pose and expression. The work has been done by certain artists who have added to the technique of clay, plaster, wax and color, the power of accurate seeing. (Dickerson, 1911c: 208–209)

The resulting groups were elegant and set new exhibition standards. Dickerson supervised and conceived most of the work, but from the start she took pains to acknowledge by name the preparators who made it happen—an early sign that she was to be a good administrator.

Dickerson's dioramas, which were to survive for decades, no longer exist, but a record of the time is provided by her brief annual reports and several articles in the *American Museum Journal*, as well as by descriptions (certainly hers) in the early Museum guide leaflets to the exhibit halls; additionally there is a sparse record in the Museum's photographic archives. The main groups are listed below more or less in order of completion, not necessarily in order of first mention in the annual reports.

THE BULLFROG GROUP (FIGS. 23, 24): This, the first group started (Dean 1910, 1911; Dickerson, 1911c, 1911d), was probably a welcome occasion for Dickerson to make

A short field expedition . . . into southern Massachusetts in July [1910] for collections and study relating to the bullfrog group. Much material for the accessories was obtained and many photographic studies were made. (Dickerson, 1911d: 40)

This diorama, which was completed in 1911, deserves special mention because the techniques involved—wax model making, painting, perspective, lighting, and composition of subjects—were the bases for subsequent groups. Wissler (1943?: 113) long afterward had the correct notion that the Bullfrog Group had been an “epoch-making project,” although he confused it with the later Florida Reptile Group.

The Bullfrog Group was “a departure from other groups in the Museum in that it had to show animal life under water as well as above the surface” (Dickerson, 1912c: 311). As abstracted from Dickerson's (1911c) description,

The water of the group is a tightly-stretched transparent sheet of celluloid. The ingredients were mixed at the Museum according to a formula which gives a less brittle product than the commercial celluloid and the sheet was made by flowing this liquid on glass in layers one over the other.

The group in connection with its descriptive labels attempts to show the general biology of the frog, its swimming, croaking, breathing under water and in air, the manner in which it “lies low” before a near en-

emy when it cannot escape by leaping, its food habits in connection with small mammals, birds, snakes, fish and turtles, insects and snails. It also shows the metamorphosis from the tadpole.

The Bullfrog Group is novel in that it has a transparent background, curved in panoramic fashion and made of fine and durable linen. This is painted in transparent colors, the high lights on the front, the shadows on the back, in an effort to obtain a realistic woodland scene with shifting light in it and through it as in nature. The light at the back of the canvas has been kept at the minimum and balanced on the canvas in front by a weak indirect light, while a relatively strong direct light has been focused on the foreground as if from the western sky (direction of the observer). It has been hoped to obtain by this lighting some slight illusion and perspective notwithstanding the smallness of the space (8½ by 6 ft.). To help the perspective in a minor degree in addition, there has been resort to various small devices: for instance, the foreground slopes upward to meet the background; a total of five inches; tall shrubs at the front are made to lead into ones less tall farther back, large-leaved plants such as alder and birch are in the immediate foreground, willow and other small-leaved plants at the rear, leaves of water lilies and pickerel weed are graded back from larger to smaller; while conspicuous colors, the red of Turk's cap lilies and the white of azaleas, are placed well forward and the purple pickerel weed carries the eye back where the effect of distance and shadow is desired.

The principles of perspective and color are learned—even if not always successfully employed—by every good exhibit preparator, set designer, or artist. But Dickerson was trying also for something additional. She wanted in a small space to exaggerate nature's abundance in what she considered a natural way:

At first glance the group presents a small cove reaching into a larger expanse of water, with only four or five frogs in view. The abundance of vegetation and the great array of animal life (there are some half-hundred specimens in the group) have been subordinated to the effect of the whole. All of the animals are directly before the eye yet are so chosen and placed as to be inconspicuous except on a more careful search, thus imitating the condition in nature.

WATER MONITOR GROUP: This was outside Dickerson's theme of North America, but the availability of a sizable *Varanus*, a cobra, and a Russell's viper were too good to pass up. A photograph of the resulting small habitat group is shown by Dickerson (1911c) under a caption “At the Edge of the Jungle.” Dickerson's attention to detail led her to obtain plants from India (from the New York Botanical Garden), for reproduction in wax.



Fig. 25. Mary Dickerson's American Giant Salamander Group (*Cryptobranchus*). Although the problem of showing animals underwater had been solved in the Bullfrog Group, the casting of these flaccid salamanders out of water posed still another difficulty. Group finished in 1912; photograph taken in 1925. AMNH Photographic Archives 310930.

The wax technique was not appropriate for the large lizard, which had the skin "mounted over a manikin modeled from life, following the methods of the animal sculptor's work on mammals," with "a living monitor at hand for study of action" (Dickerson, 1911c: 207 [photograph and caption], 209).

SOUTH CAROLINA SNAKE GROUP: As pictured in Dickerson (1912a: 30), this small group has water snakes (including a brood of 60 young) and cottonmouths amongst logs, stumps, and water hyacinths. A closeup of one of the cottonmouths was shown earlier by Dickerson (1911c: 211), who said that, in the case of snakes, "the skin is often removed, filled with clay, and modeled into correct form, when it is posed ready for plaster mold and wax cast."

THE AMERICAN GIANT SALAMANDER GROUP

(FIG. 25): Completed in 1912, this group portrayed the life history of the American giant salamanders or hellbenders (*Cryptobranchus*). The problem of showing animals below the surface of water had been solved in the Bullfrog Group, but other problems at first "seemed insurmountable" (Dickerson, 1912c: 311, 313):

One was imposed by the nature of the haunt of the hellbender which lives in rapid flowing rivers and has its nests under rocks with the openings away from the current on the down side of the stream. It seemed no easy task to represent a river as if flowing directly toward the observer, and especially to do this within the limits of seven feet of horizontal foreground—in which the real objects could be displayed—and a vertical painted canvas joined to the foreground at the rear and sides. How well the technical difficulties were overcome must be judged by each observer of the finished group. He can see most of the means to

the end: the upward slope of the foreground to meet the background; the arrangement and the varying size and color of rocks and accessories to produce perspective; the peculiar curve given to the canvas for the sake of perspective (compare with the bullfrog group); and the focusing of artificial lights on definite parts of the group to call attention to the immediate foreground and to the sunlight in the distance on the river, leaving the line of union of canvas and foreground in dimness. Many small details also have been inserted for the sake of realism, such as floating foam on the surface of the water and grasses beneath swept by the current. Again, rocks on the canvas are built out with papier-maché to make them more realistic

...

Dickerson and the preparators had earlier found that "Wholly aquatic amphibians are not likely to maintain the shape for casting when removed from the water." In the instance of a specimen of the Japanese giant salamander, on loan from the Bronx Zoo and too valuable to sacrifice in any case, a model was sculpted by hand and cast in plaster (Dickerson, 1911c). Two American hellbenders were "cast from a model in clay made from study of the living animal" (Dickerson, 1912c: 313), but a better way was developed to obtain an additional seven hellbenders in varying poses for the exhibit:

They are thin-skinned and soft-bodied and when taken from the water keep their form about as well as does a jelly-fish and in truth are just about as satisfactory to cast. The impossibility of getting casts of soft-bodied, aquatic amphibians has spurred on some experiment and much discussion in the taxidermy shops of the Museum for a year or more. Casts made from the frozen animals and from forms killed and slightly hardened in formaldehyde had given little more than caricatures of the salamanders and no medium had been found which would harden in water and thus replace plaster of Paris in the mold-making. One day however one of the Museum sculptors, who has studied in Paris art schools, was heard to tell the story of his experience in making a mold of a delicate flower under oil instead of in air. This gave the clue. The salamanders were killed with ether, then immediately posed under oil—kerosene oil was used which is clear and transparent—where the soft specimens with their delicate rufflings of skin were buoyed up as if alive in water. Then the molds were made, the salamanders hardening in this medium quite as in air. Thus the wax casts of the group are lifelike not only in matters of pose and form but also in every minute detail of surface texture.

AN EXHIBIT NOT MADE: Dickerson conducted fieldwork in Arizona in 1912, primarily to sketch out plans for an Arizona habitat group. She decided, however, that the

variety of reptiles that she wanted to show were not to be found in a single restricted habitat, but she did collect scientifically (see under Some Early Department Fieldwork).

THE LOWER CALIFORNIA GROUP (FIG. 26): This group, completed in December 1913, had its origins in the 1911 *Albatross* Expedition to the Gulf of California and in materials obtained by C. H. Townsend of the New York Aquarium. Details are to be found in the unedited draft of the annual report for 1913. The group was discussed in two published annual reports (Dickerson, 1913a, 1914d) and summarized in the second:

The California Group, with its lizards and snakes fitted to endure existence in the desert and showing the brilliant hot sunshine, sand, cacti and volcanic rock of a Lower California island, is in striking contrast with the other groups which represent aquatic animals and moist situations in temperate North America. The background of this group is by Hobart Nichols of the National Academy [who also painted the background of the Giant Salamander Group and The Florida Group].

THE TOAD GROUP (FIGS. 27, 28): Completed in 1914, this was the fourth of Dickerson's North American temperate-zone habitat groups and "the largest and most complex yet attempted by the department." It was "one of the results of several years of field and laboratory study by the Associate Curator [i.e., Dickerson] before coming to the American Museum" (Dickerson, 1915b: 66), and it revealed her intimate knowledge of the amphibian fauna of an "original spot lying under the sunshine of May in Rehoboth Township, Massachusetts," including her observations on the comparative ecology of two species of toads.

Dickerson's (1915a) *American Museum Journal* article on the Toad Group was the last one that she wrote on the herpetology exhibits, although the work did not stop. This article differed from its predecessors (1911c, 1912c) in speaking less to the mechanics of the exhibit than to its esthetics, even though Dickerson acknowledged the public's "more or less active dislike for the subject."

Slye (1923: 509) was later to observe that her friend Mary Dickerson had been "peculiarly a woman who all her life kept her soul remote from almost every contact." But this exhibit and her writing about it drew some-



Fig. 26. Mary Dickerson's 1913 Lower California Group. Unlike her other major groups, Dickerson had to rely completely on other people for the specimens and ancillary habitat materials. She purposely exaggerated the diversity of lizards in a small area, but, characteristic of her groups, one has to look closely to find all the animals. AMNH Photographic Archives 34262.

thing from within Dickerson—memories of other days, perhaps more:

... no mere words can carry the news of the woods at any season with the vividness of the reality ... the most commonplace scene [taking] on meaning and beauty—perhaps under the influence of the mist of dawn, the quietness of dusk or the blackness of storm, perhaps when it is lashed by wind and rain, or afterward transfigured in a radiance of sunshine.

It is in this last mood that the recent group has been fashioned and in May, the season of new life, with the thought that perhaps this concrete picture would be able to do what words accomplish but inadequately. That in it there would be seen with unusual vividness and attractiveness the natural history facts involved, and that perhaps, in addition, there would be felt—by a child here, a lover of beauty there, the poet everywhere—some part of nature's subtle personal invitation and some reflection of the spiritual response which the original scene might invoke. (Dickerson, 1915a: 166)

THE FLORIDA REPTILE GROUP (FIG. 29): A few small groups were being worked on by 1917, including especially the Florida Gopher Turtle Group and the New Zealand

Sphenodon Group, but the major exhibit was one started in the summer of 1916 and brought to completion in the summer of 1918. The Florida Reptile Group (or simply the "Florida Group") was larger than any previous group (foreground about 275 ft², background 475 ft²) and is best described and illustrated in the annual report for 1917 (Dickerson, 1918b):

Like the other reptile and amphibian groups, this, on a larger scale, shows what can be accomplished with wax as a medium ... The group is not simple; it is very complex and shows many species and many individuals [including alligator nesting and casts of dozens of species of snakes, lizards, turtles, and amphibians]. In planning the various reptile groups in the American Museum, where space is so much an item to be considered, it has been the feeling of the department that enough was not accomplished when a group set forth one theme or one or two species of animals, or when it was made a beautiful picture only; but that it should be as highly educational as possible in number of forms portrayed, in life histories and habits and in adaptation to the given environment—even though this should mean sacrifice, to



Fig. 27. Mary Dickerson's 1914 Toad Group, perhaps better termed New England Group. Although Dickerson used this group to stress her own observations on the natural history differences between the toads *Bufo americanus* and *Bufo fowleri*, she also incorporated six species of frogs, a salamander, and two snakes in the group. This, her favorite group, represented a specific place in Massachusetts "in May, the season of new life" (Dickerson, 1915a). AMNH Photographic Archives 34586.



Fig. 28. Detail of the 1914 Toad Group, showing tree frogs (*Hyla versicolor*) in the foreground. AMNH Photographic Archives 34592.

some extent, of the æsthetic element, because of decreased simplicity.

. . . The field work for the group was done in the swamps and on the rivers within a radius of from twenty to sixty-five miles of Orlando, and all accessories and animals of the group are made directly from the living material.

Although not explicitly stated in the pub-

lished annual reports, Dickerson involved herself in the fieldwork for the Florida Group, as shown by the archives¹⁵⁹ and by use of the first-person singular in her draft for the annual report for 1916. A previously unpublished section of this draft is quoted below (she later salvaged this for use in her



Fig. 29. A section of Mary Dickerson's 1918 Florida Reptile Group, her last major exhibit. AMNH Photographic Archives 36814.

published report for 1917 [Dickerson, 1918b] by shortening it and making it less personal):

It is hoped that . . . the group may succeed in giving one somewhat the rare experience that comes to the person who for the first time visits these unique swamps of our country. What impressed me most in Florida in my few days of field work there, was not the turpentine pines, not the palmettos, not the luxuriant tropical vegetation along the rivers. Neither was it the alligator that swirls the water as he goes to his home in the bank of the River Wakiwa, nor the clear river depths where gars and the great terrapins swim. These are all concepts well in the mind. One is not impressed by anything unusual in the tangled mocasins and water snakes in the swamp nor the coiled diamond-backs among the saw palmettos. Reading and pictures have made everything familiar and to be expected. But the cypress swamp itself is a different matter. We are not prepared for that. No pictures and no reading can carry the effect of that to the mind. The cypress swamp might be on another planet, so different is it from anything on this globe.

She mentioned to Thomas Barbour "what fun it was to paddle and plow through the cypress swamps."¹⁶⁰ Dickerson had been impressed by the cypress swamps and, as in New England, she once more seemed to draw emotional inspiration from the countryside. Regrettably, from then on she would have to draw upon memory, for it seems to have been her last significant field experience.

1913: THE FIRST "REPTILE HALL"

Second-floor South Pavilion: This hall illustrates a phase of Museum progress, the temporary disorder that precedes an ultimate change for the better . . . Here, awaiting the construction of a new wing is exhibited the collection of reptiles and amphibians. (Am. Mus. Nat. Hist., 1913: 43)

As previously mentioned, there were herpetological exhibits in the East Mammal Hall in 1906 on the second floor of the old east wing (the wing in the eastern half of the 77th Street façade). Other reptiles and amphibians, including the New York City area exhibit, were located on the same floor in the "tower room beyond the East Mammal Hall," meaning the easternmost tower or turret that is part of the 77th Street façade.

In 1911, some or all preexisting herpetology exhibits seem to have been moved from the tower room into the adjacent eastern end of the large east hall, with an arrangement of cases to "form a partition separating the

[herpetology exhibits] from the rest of the large hall." The tower room was then freed up and specially lighted for Dickerson's habitat groups:

This is practically a separate room, circular in outline, in the tower, and can be kept darkened—an especial advantage, since the visitor may stand in shadow and look at all sides into cases brightly lighted, after the fashion of the new "habitat" bird groups. The success of the first group in this gallery, showing bullfrogs, was immediate and encouraging. (Dickerson, 1912d)

The Bullfrog Group (1911) and the Giant Salamander Group (1912) were established in this second-floor tower room. A description of some of the exhibits is given in Guide Leaflet 35 (Am. Mus. Nat. Hist., 1911).

In 1913, the Bullfrog and Giant Salamander groups and the other herpetology exhibits were moved to new quarters in "the central hall on the same floor" (Dickerson, 1914d), that is, in the central part of the 77th Street façade or what was called the "South Pavilion" in the old hall guides:

These two groups with the Lower California and Toad Groups fill the new gallery constructed for them, with the exception of a corner space which it is hoped may be filled with a Florida Group. Such a group can be made to emphasize turtles and snakes, and thus round out North American reptiles synoptically, while it can also show many other species because of the large and interesting reptile and amphibian fauna of Florida.

The Toad Group had been installed partially finished, since it was completed in 1914. All Dickerson's subsequent exhibits, including the Florida Reptile Group (1918), were installed in this hall, which opened with little or no fanfare.

Guide Leaflet 37 (Am. Mus. Nat. Hist., 1913) indicated that the quarters were supposed to be temporary: "Here, awaiting the construction of a new wing is exhibited the collection of reptiles and amphibians." This same wording was given in at least seven subsequent hall guides published between 1914 and 1922. We read in the hall guides (e.g., Am. Mus. Nat. Hist., 1913) that

The classification of these animals is shown in the cases along the walls; the groups in the center of the hall represent various reptiles as they appear in their natural haunts . . . Entering the darkened room near by we find a group of unusual interest, showing the common bullfrog of North America.



Fig. 30. A scale model for the 1927 New Hall of Reptile and Amphibian Life. Compare with figures 31–32. AMNH Photographic Archives 310474.

Thus, Dickerson somehow managed to arrange another dark area where her groups could be specially lighted. I have seen no other description of this specially designated or partitioned-off gallery in the second-floor South Pavilion, except for that of Noble (1925f), who said that the area also contained a gloomy variety of mammals that “cast a most ghostly atmosphere over the reptile hall.”

1927: NEW HALL OF REPTILE AND AMPHIBIAN LIFE

The entire third floor of the recently-completed east wing of the Museum will soon be thrown open to the public as a new hall for the exhibition of reptile and amphibian life. In this hall there have been arranged not only Miss Dickerson's magnificent groups, but a whole series of new ones. (Noble, 1925f)

Except for the odd chore, I find no reason to believe that either of Dickerson's Assistant Curators (Noble and Schmidt) were significantly involved in exhibition work under her direction—she found plenty of other things for them to do. But by the end of 1920 she was gone, and Noble took over running the department, including his very active and enthusiastic extension of her exhibition program, which is best followed in his annual reports and in articles published in *Natural History* (Noble, 1923e, 1923f, 1923o, 1925f).

The year 1921 saw the addition of large cases for crocodilians, inauguration of a new exhibit of the local fauna (within a 50-mile radius of New York City), a variety of casting and mounting jobs, and extensive label revision. Some of this work (e.g., see figs. 33, 36) had been initiated by Dickerson, whose successful exhibits had led to President Osborn's expectation of “a beautiful reptile hall in the new southeast wing” (later called the “east” wing, see fig. 17).¹⁶¹

In his report for 1922, Noble (1923p) made perhaps the first public announcement that a new Hall had been planned:

In anticipation of the new Hall of Reptiles and Amphibians, to occupy the third floor of the southwest [sic]¹⁶² wing now under construction, every effort was made this year to develop new exhibits. Three major habitat groups were planned, the field work carried out and the groups well started.

Noble and his wife, Ruth Crosby Noble (Assistant Curator, Department of Education), had conducted in that year (1922) the very successful Angelo Heilprin Expedition to the Dominican Republic to “secure materials for the construction of two new habitat groups,” namely in regard to the “largest tree frog in the world” (*Hyla vasta*) and “the most powerful if not the largest, lizard in the Americas” (the rhinoceros iguana):

Nothing was known about the life history of either

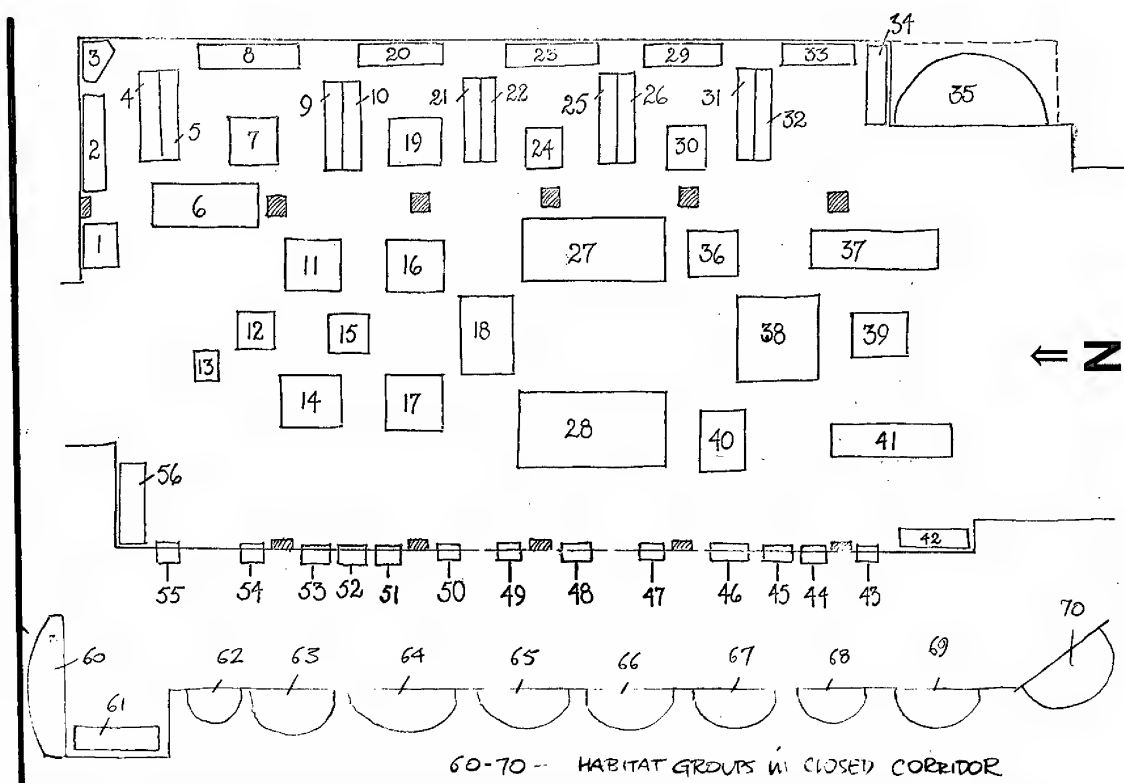


Fig. 31. Floor plan for the 1927 New Hall of Reptile and Amphibian Life. From an undated sketch in the departmental archives, showing location and subject matter of cases.

(1) Mimicry among Snakes. (2) The Reptile Skeleton. (3) Tuatara and Shearwater. (4) Reptile Skeletons. (5) Poisonous Snakes. (6) Comparison of Lizard and Crocodile Skeleton. (7) A Rattlesnake Den. (8) Rattlesnakes. (9) Harmless Snakes. (10) Crocodilians. (11) The Diamondback Rattlesnake. (12) The Copperhead. (13) The Rattle of a Rattlesnake. (14) Texas Rattlesnake. (15) Pine Snake. (16) Central American Iguana. (17) Mexican Gila Monster. (18) The Edge of the Jungle. (19) The Flying Dragon, *Draco volans*. (20) Iguanid Lizards. (21) Lizards. (22) Economic Importance of Reptiles. (23) Turtles. (24) Painted Turtle. (25) Turtles. (26) How Do Reptiles and Amphibians Breed? (27) American Crocodile. (28) The Alligator. (29) How Do Reptiles and Amphibians Protect Themselves? (30) Moccasins and Water Snakes. (31) How Do Reptiles and Amphibians Feed? (32) Salamanders. (33) Salamanders. (34) Frogs and Toads. (35) Monitor Lizards. (36) Alligator Snapper. (37) Cobra and Mongoose. (38) Gopher Turtle. (39) Giant Tortoise. (40) Box Turtle. (41) The Alligator. (42) Snakes of Fable and Fact. (43) What are Reptiles and Amphibians? (44) Adaptation. (45) Natural Selection. (46) Adaptive Radiation. (47) Isolation. (48) Parallel Evolution. (49) The Growth Factor in Evolution. (50) Concealing Coloration and Form. (51) Parental Care in Amphibia. (52) Attracting Devices. (53) Frightening or Warning Devices. (54) Snake Bite. (55) Why Do Reptiles and Amphibians Shed Their Skins? (56) Miscellaneous Reptiles. (57) Buried Lizard Eggs. (58) Arboreal Lizard Eggs. (59) Origin of Species. (60) Reptiles and Amphibians in a Cypress Swamp. (61) Three Principles of Concealing Coloration. (62) Gila Monster. (63) Rhinoceros Iguana. (64) Galápagos Iguana. (65) Reptiles of the Southwest. (66) West Indian Marsh Frogs. (67) New England Marsh. (68) Bullfrogs. (69) Giant Salamander. (70) Leatherback Turtle.

form, but it was hoped that sufficient data might be secured to reproduce the life story of these spectacular creatures . . . Doctor and Mrs. Noble of the Museum Staff . . . were fortunate in finding both forms and in working out their life histories. Over forty iguanas and over two hundred frogs were shipped to

the Museum alive, while twenty-five casts were made in the field. Sufficient accessories were collected to reproduce the ancient sea bed where the giant lizards now occur. Ferns, shrubbery, and other vegetation were prepared and shipped to the Museum, to furnish the basis from which will be reproduced a small sec-



Fig. 32. The New Hall of Reptile and Amphibian Life in November 1928, nearly a year and a half after its opening. The arrangement of floor cases seems to match the floor plan in figure 31, except that a leatherback sea turtle has been added to face the entrance to the Hall. View is looking to the North. AMNH Photographic Archives 312542.

tion of a Dominican mountain torrent—the home of the giant tree frog.

Noble's finished rhinoceros iguana exhibit is shown in figure 49.

In 1923 (Noble, 1924i), there was a great flurry of exhibition activity on several fronts. Assistant Curator Ortenburger and Mrs. Ortenburger were sent to Arizona (fig. 11) "to study the Gila Monster, preliminary to installing an accurate group of these saurians"—another successful departmental foray, with all kinds of material being obtained, including 15 Gila monsters and the necessary accessories and habitat photographs. With the help of volunteer assistant George Sprague Myers (fig. 48), much local fieldwork was carried on for research and to gather information for exhibits. Myers (1930) later published some of his notes from the summer of 1923, mentioning being in the field at some point with Dr. and Mrs. Noble.

Many animals were cast or mounted in 1923, and plans were made for additional groups:

There is, of course, no room in the present hall of reptiles for all of these groups. They will probably be installed as soon as they are completed in the new Hall of Reptiles and Amphibians.

A model of this new hall was made during the year according to the plans which have been developing during the past two years. It was found that the habitat groups could be arranged to the best systematic and artistic purposes behind a cloister along the west side of the new hall . . . Miniature glass cases were made and arranged in the model to determine the exact position of the future exhibits.

A photograph of the miniature model of the Hall still survives (see fig. 30).

Work continued through 1924 and 1925, when Noble (1925f) published a preview of the new hall that he optimistically expected to open in the coming year (in the Museum's history, delayed openings seem more common than not). Several novel exhibits were still being made, including the *Sphenodon* Group (fig. 36):

The *Sphenodon* Group, so long under contemplation [having been started by Dickerson¹⁶³], was begun under a totally new plan and finished during the fall [of 1925]. It shows the *Sphenodon* at home on a shady



Fig. 33. Florida Gopher Turtle Group. Dickerson had started this group by 1917, but it was finished by Noble for the New Hall of Reptile and Amphibian Life. This photograph was taken in 1924 before the group was glassed over; the finished case can be glimpsed in figure 32, behind the giant tortoise. AMNH Photographic Archives 310697.



Fig. 34. Enlarged model of the Surinam toad (*Pipa*), with emerging froglets. Placed on exhibit in 1922 (Noble, 1923p); photographed in 1925. AMNH Photographic Archives 311021.

hillside of Karewa Island, New Zealand, where it frequents the burrows of the Pink-footed Shearwater, *Puffinus carneipes*. A portion of the hillside is shown in section, disclosing one of the petrels brooding its single egg while a *Sphenodon* smuggles [snuggles] closely against the body of the bird. (Noble, 1926n)

In 1926, a king cobra and mongoose were among the more spectacular exhibits finished (see fig. 40 for the surviving cobra), and the painter Francis L. Jaques started a series of murals to go above the habitat group cloister in the new hall (fig. 32, upper left). This also was the year of Douglas Burden's Dutch East Indies Expedition (see Burden, on the Trail of Dragons, under Some Early Department Fieldwork), which brought back material for an exhibit of the giant lizards of Komodo; these were to be beautifully mounted by standard taxidermy techniques (fig. 53).

Smaller reptiles and amphibians were being replicated by whole-wax casting until Noble devised a faster (albeit less elegant) way of producing exhibit animals by using the technique of paraffin infiltration (as published in *Novitates* by Noble and his assistant Jaekle; see Noble, 1926h, in appendix 3). The idea was not original with Noble (he ac-



Fig. 35. Galápagos Island Group, showing both marine iguanas (*Amblyrhynchus*) and land iguanas (*Conolophus*). This diorama was commenced in 1923; materials were obtained for the Department by Harrison Williams and William Beebe of the New York Zoological Society (Noble, 1924i). Completed diorama photographed in May 1925, before placement of glass front. AMNH Photographic Archives 310960.



Fig. 36. The tuatara (*Sphenodon*) of New Zealand, showing the reptile at rest in the burrow of a nesting sea bird (Pink-footed Shearwater). An exhibit planned by Mary Dickerson in 1916, but finished by Noble in 1925. AMNH Photographic Archives 311225.

knowledge getting it during a trip to Vienna), but he and Jaekle had to work out the process for themselves. Several years later, Noble provided additional information in a letter and conceded that he (and others) had overlooked an early reference:

In 1885, O. P. Hay (American Naturalist XIX, p. 526) described how the infiltration technique employed by the microscopist to obtain firm tissue, may be utilized on whole objects to secure retention of original form and color. He stated that he had prepared "lizards, small turtles, fishes, mussels and earthworms" by using a mixture of Canada balsam, paraffin and vaseline for his infiltration material . . .

However, as stated in [Noble and Jaekle, 1926], the idea did not come to me until 1925 when I made a visit abroad. There I found Professor Hochstetter of Vienna with a wide variety of infiltrated specimens including mammals and lizards in his laboratory. Hochstetter apparently did not publish on this technique until 1927 (Die Umschau XXXI: 650-652). Hochstetter would not tell me, nor any one else, the exact details of the method, but it was obvious to me in 1925 that the well-known laboratory method of infiltrating could be utilized for the same purpose. The only detail which I believed necessary to work out was that of discovering a fixative which would

prevent shrinkage completely and retain the color. We worked on this method for a year in the American Museum and finally secured such fixatives. Hochstetter in his published article did not state what his fixative might be. However, Schmeidel, working in his laboratory, published in 1925 (Verhandl. Zool. Bot. Ges. Wien LXXIV-LXXV: 285-288) a notice as to at least one of the fixatives which Hochstetter used. This paper did not come to our attention until after our paper had been published. We had by this time tried this fixative and found it to be not as satisfactory as the fixatives published in our 1926 paper. All these fixatives employed by Hochstetter, Schmeidel and myself are well known in zoological laboratories for fixing tissues for microscopic purposes. Our various techniques may therefore be described as adaptations of embryological fixatives for use in whole mounts . . .

The work of Hay was unknown to me when we began our work, but in 1928 (Science LXVII: 557) Hay claimed priority for the idea of infiltrating whole specimens. Hochstetter has apparently patented the idea and now Holmes is apparently taking steps to patent the details, which were worked out in the Museum laboratories.¹⁶⁴

In 1926 and 1927, Noble and his staff prepared by the paraffin infiltration method a

“large series of toads, salamanders, lizards, turtles, and snakes” for the new hall.

The new hall opened to the public in June 1927, justifying Noble’s earlier claim (1926n) that the Museum would have “the largest and finest hall in the world devoted exclusively to existing reptiles and amphibians.”

All of Mary Dickerson’s laboriously worked-out habitat groups were incorporated into the new hall, for Noble (1925f: 382) had considered those as being “perhaps the finest series of reptile and amphibian groups ever produced.” An old hand-drawn plan (fig. 31) for the new hall indicates the tremendous diversity of subject matter and also shows the incorporation of Dickerson’s groups. Some of the other groups also date from Dickerson’s time, but the bulk of the exhibits seem to have been produced as the result of Noble’s formidable organizational skills and prodigious energy during 1922–1927.

The magnificent Komodo Dragon Group (fig. 53), which could not be ready for the June 1927 opening, was completed early in 1928 (Noble, 1929l):

The group shows a pair of giant lizards feeding on a wild boar which they have killed. A third is about to dispute ownership with the others.

Noble (loc. cit.) added a modern touch by means of a projector showing a film clip of the dragons in action:

To the right of the group is installed a motion picture taken by Mr. Burden showing the feeding habits of the lizards. The film is shown automatically and has become so popular that it has been found necessary to suspend its use when the Museum is crowded.

(See Mitman [1993] for extensive discussion of the Burden film and its use in the above and other contexts, as well as of Noble’s own increasing interest in the use of cinematic technology.)

Another technological touch, a mechanical one (fig. 37), was added in 1931 (Noble, 1932m):

Of the several exhibits placed in the hall this year none has caused more favorable comment than the “rattling rattlesnake,” a model of a rattlesnake with a real rattle which buzzes when a button is pressed. Behind the snake is a cross-section of a rattle with a label explaining how the rattle is formed and what its significance appears to be in the life of the snake. The success of this exhibit clearly shows the impor-



Fig. 37. The push-button rattlesnake, introduced into the Hall of Reptile and Amphibian Life in 1931. A handwritten page found with the draft of that year’s annual report states that the “mechanical rattlesnake . . . was made possible by the ingenuity of Mr. Hassler.” The snake was very popular and was still in operation when Richard Zweifel arrived at the Museum in 1954. Zweifel, however, grew to dislike the aging contraption, since a duty of the new Assistant Curator was to check it frequently to make certain that it was in working order. Photographed in 1934. AMNH Photographic Archives 117728.

tance of dynamic demonstrations and working models in holding the attention of visitors.

This sort of thinking was leading Noble to envision another kind of hall—one explaining and demonstrating biological principles and animal behavior—and Noble made substantial progress towards a Hall of Animal Behavior in the several years before his death in late 1940.¹⁶⁵ The first behavior exhibits were put wherever room could be found, and the Hall of Animal Behavior appears never to have gotten much past the stage of a hall in progress; it was still called being called the “temporary Hall of Animal Behavior” after Noble’s death and survived for only a few years afterwards.¹⁶⁶

But the 1927 Hall of Reptile and Amphibian Life was a “permanent” exhibit hall, inexpensive to maintain in tough times and not to be jostled aside by other exhibits—a major accomplishment for the Department of Her-

petology given the early years of its moving exhibits. The Reptile and Amphibian Hall would remain in place, with periodic fussing and additions, temporary exhibits (some from the Department of Experimental Biology), and maintenance, for the next four decades.

The next major innovation was the introduction of live animals as temporary exhibits in the Reptile Hall and elsewhere.

THE MUSEUM AS ZOO

In the Hall of Reptile Life, an inexpensive method of illustrating interesting facts about reptiles has been developed. Living specimens which bring out some particular point in the natural history of the group have been introduced into the hall. (Noble, 1936m)

Starting in 1935 (if not before), living material was added to the "Reptile Hall" (a convenient abbreviation then and now) in order to demonstrate particular points in natural history:

Frogs that hatch fully formed from eggs were shown with the help of a special enlarging machine. Snapping turtles, developing within their egg shells, were revealed by cutting windows in the shells and throwing an image of the embryos on a large mirror. Other exhibits showed the difference between lizards and salamanders and between certain kinds of snakes.

Some specimens would have come from the "reptile colony" that Noble maintained first in Herpetology and later in Experimental Biology, after the latter had received spacious new quarters atop a new wing of the Museum (fig. 9). The procedure as described in 1936 was to show each demonstration for approximately two weeks. It can be assumed that the animals were well cared for, following the departmental tradition set by Dickerson:

It may be said that Miss Dickerson had a real affection for each creature she studied. No living material other than that which could be properly cared for was ever permitted in her laboratories. (Noble, 1923n: 515)

Some exhibits were intriguing, such as one in the temporary behavioral hall, in Noble's last year (1940):

The function of protective coloration is explained in a new exhibit displaying live copperhead snakes. The living snakes blend into the background of the exhibit, and the function of such blending is illustrated by

a mechanical device in which a model snake is made to appear and disappear alternately.

A sizable number of live animals were to be shown in the Reptile Hall and in the Behavior exhibits throughout the late 1930s and into the 1940s.

In addition to these exhibits, something new was added in 1938, thanks to the abundance of artists and craftsmen provided by the Works Progress Administration (WPA):

Early in the year the foyer of the subway entrance was made available for a new type of museum exhibit. By means of live animals, painted backgrounds and adequate labeling, many principles of animal distribution were shown. The importance of rafting and accidental dispersal was illustrated by a collection of living stowaways, including geckos, dwarf opossum and boas . . . Methods of survival in desert reptiles were demonstrated by lizards and snakes from the American Southwest. The animal and plant associations of Long Island utilized material from the local field . . . W.P.A. artists and craftsmen constructed the exhibits and the Department of Experimental Biology fed and maintained the living material.

Some of the WPA exhibits were simple cases, whereas others were much more elaborate dioramas with painted backgrounds and living foregrounds. The WPA support came to an end in 1942, and the Museum staff dwindled owing to the war and diminished institutional finances. The live exhibits disappeared with scarcely a trace.

There were only occasional live exhibits sponsored by the Department of Herpetology after 1942, most of which can be briefly listed from the departmental archival reports. In 1952, C. M. Bogert provided live reptiles and the text for a temporary exhibit in the 77th Street foyer, based on his collections from the Southwest and Chihuahua, Mexico. In 1968 or 1969, R. G. Zweifel displayed in the same foyer live pythons (*Chondropython* and *Liasis*) that he had brought from New Guinea. In 1971, I exhibited in the Roosevelt Rotunda live poison frogs (*Phyllobates aurotaenia* and color varieties of *Dendrobates histrionicus*), along with watercolor paintings and poisoned blowgun darts. In 1974, C. J. Cole coordinated a display of a live Burmese python, together with the cast made from the living snake, in an Exhibit of the Month. In 1975, Cole used live lizards in a temporary "Showcase" exhibit, "It Only Takes One," on parthenogenetic reproduction in animals



Fig. 38. The 1977 Hall of the Biology of Reptiles and Amphibians. See figure 39 for case plan. View is looking north (compare fig. 32 for same view of the 1927 Hall of Reptile and Amphibian Life). Photographed by Denis Finnin, 1999.

and the evolution of all-female species of reptiles.

Exhibits sponsored by departments other than Herpetology or Experimental Biology (Animal Behavior) that included occasional live amphibians and reptiles have been rare. There have been no live exhibits in the newest Reptile Hall, although Zweifel, in his archival report for 1968–1969, had entertained the notion (reminiscent of Noble) that “exhibits of living animals of particular interest should be a regular feature . . . perhaps in the proposed Hall of the Biology of Amphibians and Reptiles.”

1977: HALL OF THE BIOLOGY OF REPTILES AND AMPHIBIANS

Most of the exhibition halls contain information gained through original research in laboratories and in the field, aimed directly at describing and explaining the principles, phenomena and specimens that are the subjects of display. An example is the Hall of Reptiles and Amphibians. (Director Thomas D. Nicholson, 1977, 108th Annual Report)

The old 1927 Hall of Amphibian and Reptile Life set standards of interpretive technique and was elegant for its time—stone walls and cases with metal or bronze-painted frames gave “an atmosphere in keeping with

the character of the creatures portrayed.”¹⁶⁷ I saw this hall too briefly on my first arrival at the Museum, and I regret that I did not make a complete photographic record (which seems never to have been done). But I was occupied with my own affairs, being ignorant of the fact that my new department had a complex and often difficult past, and that I was looking at something with its own remarkable history. It was easier to see the dust and dated labels.

Curator Bogert had early notions of replacing the Hall that he had inherited from Noble, writing in the department’s archival report for 1944 “of the drawing up of plans for a more comprehensive hall of reptiles and amphibians with greater integration of exhibits.” This was still only a notion a decade later, by which time the laboriously acquired expertise of producing wax casts or paraffin-infiltrated specimens seems to have been lost in the Museum. Bogert and the preparators were having trouble providing the occasional herpetological mounts for other halls that were being produced. Bogert admitted in his report for 1957–1958 that

relatively few reptiles and amphibians have been included in the newer exhibits. This is not because of

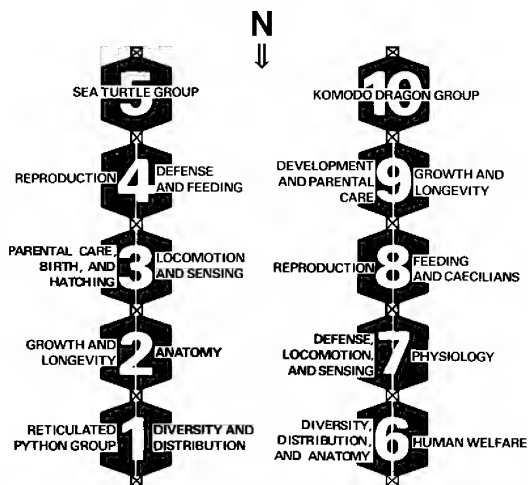


Fig. 39. Plan of the 1977 Hall of the Biology of Reptiles and Amphibians (from Bergmann, 1978).

any lack of availability of specimens, but rather is related to the quality of the average mounted specimen produced . . . It is evident that before any large-scale program involving reptiles and amphibians can be undertaken, the techniques of preparing mounted specimens of these animals must be improved, or old methods must be re-learned . . . The Department of Amphibians and Reptiles has cooperated with the Exhibition Department in their efforts to adapt methods of plastic infiltration to reptile mounting, but thus far the results have left much to be desired . . .

It is not certain what progress was made on the preparatory side during the next decade, but at least the administration was won over to the concept of a new hall. In his report for 1962–1963, Bogert visualized the new hall as a parallel arrangement of amphibian and reptile displays with a related parallel of biological themes. In the following year, Curators Bogert and Zweifel collaborated on a 53-page outline for the new hall (reptile section largely by Bogert, amphibian section largely by Zweifel). The first paragraph of this script, submitted by Bogert in the spring of 1964, explicitly set out the philosophy of the new hall:

The Hall should illustrate and explain the outstanding features of the amphibians and reptiles, their attributes, their biology, and their natural history. In order to attain a balanced presentation within the space allotted, the exhibits will be largely restricted to features that are peculiar to or especially characteristic of amphibians and reptiles. Whenever possible exhibits will illustrate broad principles. Primarily, however,

the Hall is designed to convey adequate and meaningful concepts of the two main groups (or classes) and the principal subgroups (orders and suborders).¹⁶⁸

The above statement suggests what Bogert had meant in 1944 when he called for a “greater integration of exhibits.” Dickerson had a clear objective of producing a series of elaborate habitat groups to portray North American herpetology, with synoptic representation of the global herpetofauna. Noble consolidated her work, extended the global representation, and stressed unifying biological principles when possible; however, his hall had been an opportunistic rush to completion with little time for planning anything other than an overall celebration of “Reptile and Amphibian Life.” Bogert and Zweifel contemplated a more thoughtful teaching hall—a biology hall that probably would have appealed to Noble could he have lived to see it.

With script for the new hall to work from, the Department of Exhibition and Graphics Arts (formerly called the Department of Preparations and Installations) designed a new hall in the location of the old. The partitioning west wall was to be removed, leaving one large room (about 60 × 140 ft) with two rows of six supporting columns. The windows along the east wall would be concealed, and the columns used as supports for a double row of huge hexagonal cases (10 in all). In his archival report for 1965–1966, Bogert stated that

Mr. Bogert and Dr. Zweifel were called upon . . . to review layouts for the exhibits to go into a new hall . . . The use of hexagonal cases suspended between the pillars in the hall will make the most effective use of the space available. Designers and artists have displayed competence and imagination in this preliminary work on the hall, and their cooperation and enthusiasm are gratefully acknowledged.

But this enthusiasm would be forgotten when the new cases were finally installed in 1970, by which time Bogert had retired and the original designer had left the Museum. Zweifel and a new designer, Eugene Bergmann, were to look at the Hall and its new empty cases with awe, not because of the hall’s “clean, open, elegant look,” but from a sickening realization that the cases were *huge* and most of the objects to be displayed were *small*.

The making of the hall from this point on was well told by Exhibit Designer Bergmann (1978) in a detailed account published in *Curator*. Bergmann used great ingenuity in filling the space and making each case different from the next:

For a case that is seven feet deep, from front glass to center, exhibits must be designed to allow small items to be placed near the case perimeter for visibility. But the presentation of information in a logical sequence within the case is of equal importance. These two sometimes conflicting objectives had to be resolved as thesis and antithesis, into a synthesis that did not leave gaps in the case centers. I thanked the herpetological gods for the large skeletons in case 2.

Zweifel noted a few other disadvantages of the cases in his archival report for 1977–1978:

Opening the cases requires several carpenters to handle the large sheets of plate glass, so no exhibits requiring servicing (slides, movies, etc.) could be accommodated. Lighting is solely by overhead banks of fluorescent bulbs, so that no diversity of light angle (e.g., spotlighting) is possible, and intensity is variable only by changing the number of bulbs activated.

The original design concept called for lighting underneath each hanging unit to give the appearance of “floating” cases in a dark, windowless gallery. Although this was a nice concept, unfortunately a system of incandescent bulbs was installed that gave uneven reflections on the floor and also had the potential for increasing temperature within the cases. Consequently, it was to be lights out (fig. 38).

The parallelism between amphibians and reptiles was not as well retained as originally intended, as can be judged from the hall diagram (fig. 39). Two of the cases (sea turtle nesting and Komodo dragons) contain habitat groups, which, because of surrounding glass, lack the painted backgrounds characteristic of American Museum dioramas, and one half-case (reticulated python) also contains a habitat group. All the other cases include complex exhibits comprised of small displays tied to specific themes.

A number of mounts and models survive from the 1927 Hall and were used because: (1) they are superb and could not be bettered today and/or (2) live animals would not have been available for making replicas for new displays. For example, both reasons apply to

the Komodo dragons, while the second applies to *Sphenodon*.

Most of the wax models from Dickerson's time have largely disappeared over the years, but some did make it to the 1977 Hall (see also fig. 21). With careful handling, they proved to be as permanent as she had hoped and claimed, although frequent moves and jostling took their toll. Dickerson (1911c: 209) used a special formulation to yield less brittle casts with a high melting point, but Noble's paraffin-infiltrated specimens were more likely to melt. Bogert, in his annual archival report for 1955–1956, noted heat damage to infiltrated specimens:

... the new opaque glass installed this year in many windows around the Museum seems to be a much more efficient conductor of heat than that which it replaced [causing] some wax-infiltrated specimens that had stood for decades near windows in the Reptile Hall to suffer from melting.

New techniques of producing plastic casts from flexible molds were perfected during the 8-year production of the 1977 Reptile Hall:

A few of the mounts from the old Hall were actual skins or wax models that needed repair and painting ... new material was cast in modern plastics from specimens ... Most of the molds are latex. A variety of polyester resins have been used for different effects in casting. One polyester resin retains considerable flexibility and can be easily repositioned when a wire is embedded in the cast. (Bergmann, 1978: 202)

One of the best results is a plastic kingsnake constricting a plastic rattlesnake, *cast as one unit* from a mold made of carefully positioned, freshly killed snakes fixed in formalin (fig. 41). Another superb example, a python incubating its eggs, was cast from a plaster-of-Paris mold made from a live, anesthetized snake equipped with breathing tube (Gardner, 1974). Final realism comes from painstaking, scale-by-scale painting. The best casts produced in this manner rival the best of the old wax casts. The wax ones sometimes seem to have a slight surface translucency more like real skin (see Dickerson, 1911c: 211), but it is a subtle effect and the plastic casts are much sturdier.

Bergmann (1978) should be consulted for the story of the production of the hall. He listed brief contents of individual cases,



Fig. 40. Lure of the serpent: “*We be of one blood, thou and I*” (Rudyard Kipling). For some 40 years in the old Reptile Hall, this king cobra stared down a mongoose that was crouched behind a stone “apparently realizing his inability to cope with this enormous serpent” (Noble, 1927j). Relieved of the pesky mongoose, this venerable snake has spent recent decades in silent communication with admiring visitors in the newest Reptile Hall. Photographs are from 1977. AMNH Photographic Archives 67094, 67095.



Fig. 41. In the 1977 Hall of the Biology of Reptiles and Amphibians, newer technology of casting animals in plastic replaced the wax casting and infiltration methods used earlier in the century. Not changed was the necessity for the artist's brush to bring the cast to life. **Top:** A one-piece cast of a kingsnake constricting a small timber rattlesnake; only the rattler's fangs and rattle have been added. Photographed by Denis Finnin, 1998. **Bottom:** A small alligator snapping turtle attracting fish with its tongue lure. AMNH Photographic Archives 336682.

which are documented in more detail in departmental archives.¹⁶⁹ A summary viewpoint from the Department, in Zweifel's 1977–1978 archival report, helps round out the picture:

The success of the exhibit is in large measure a tribute to Designer Eugene Bergmann, who overcame the difficulties indicated above as well as those posed by the demands of the Curators and by seemingly insensitive Administrators.

As construction of the new cases and reconstruc-

tion of the hall proceeded during 1970, work got under way on specimens and settings to fill the cases. The basic working document, the 1964 script, was revised piecemeal but extensively to accommodate to the realities of materials available—specimens and exhibit cases—and to advances in herpetological knowledge. Work proceeded fitfully, as the number of Preparators assigned to the hall fluctuated wildly (sometimes on a daily or even hourly basis), and as the Designer was reassigned to other exhibits, in response to administrative decisions as to which facets of the exhibition program had highest priority. A February 1971 memo from the Exhibition Committee anticipated completion of the hall in 1972, but it was not until the last year of work on the hall that what might be considered a full staff of Preparators was assigned. (“Full” meaning that the Curators would have had difficulty providing work for any greater number.) The consequences of the decision to spread the available exhibition force thinly rather than making a sizable commitment to the hall at the outset were far-reaching. From the start of construction to the opening it was eight years . . . important to the economy of the Museum was the vastly increased cost of the exhibit resulting from inflation of salaries as the work dragged on.

At the level of the Designer, Curators and Preparators, cooperation and coordination were excellent. To no small degree, the multifaceted efforts of Ms. Rose Wadsworth, acting as Exhibit Coordinator, were responsible for success here. The Curators felt that at the next level—exhibition administration—there was an occasional lack of understanding of problems faced by the scientists and even, at times, by the Designer and Preparators.

With the Herpetology Department, overall responsibility lay with the Chairman, but direct responsibility for scientific aspects of particular exhibits and for working with the exhibition personnel was portioned out to all three Curators. Dr. Cole handled two half-cases—one treating reptile reproduction, the other early development and parental care—and contributed displays in two other cases: that dealing with reptilian skin and color change, and the energy section of the energy and metabolism exhibit. Dr. Myers contributed the half-case on reptile defense and feeding, the exhibit on caecilians and the displays involving poison-dart frogs in the amphibian defense and human welfare exhibits. The remaining exhibits were Dr. Zweifel’s responsibility.

Case labels were written by the Curator responsible for the particular display, but all label copy was edited and criticized by each of the other Curators. In addition, all label copy received the scrutiny of Ms. Margaret Cooper . . .

Successful completion of the Hall of [the Biology of] Reptiles and Amphibians was even more of a team effort than would be inferred from the foregoing. Colleagues around the world contributed generously of their time, information and specimens. Special mention must be made of Dr. Samuel B. McDowell, who was consulted innumerable times on topics of reptile and amphibian anatomy [and] Dr. Tetsuo Koyama of the New York Botanical Garden,

who was most generous in helping on botanical aspects of the displays.

The Hall of the Biology of Reptiles and Amphibians opened to the public on November 18, 1977, and proved to be popular for both casual visitors and serious students. Museum educators have volunteered opinions that the logical layout of the Reptile Hall makes it one of the most effective halls for teaching. At the time of this writing, the Department of Herpetology has been responsible for the same hall space for more than 70 years, with the newest exhibit having been in service for over 20 years. At least some parts of the displays need thoughts of revising, and another generation of curators and preparators might benefit from lessons of the past.

EXHIBITION MISCELLANEA

Over time, few years have gone by without the Department supplying specimens and expertise for one exhibition purpose or another, and not always within the Museum itself. In 1989, a large mounted crocodile was lent on an emergency basis to a sister institution, the Guggenheim Museum, which was inaugurating a major show by Mario Merz, “the grand old man of contemporary Italian art” (reviewed in *The New York Times*, September 29, 1989). Mr. Merz’s original specimen was seized on entry into the United States as a violation of the Convention on International Trade in Endangered Species of Flora and Fauna (CITES)!

Periodically, one of the curators or the Department at large becomes significantly involved with a temporary exhibit, including those already mentioned under “The Museum as Zoo.” An unusual notion for temporary wartime exhibits in 1942 was to direct “the attention of the public to natural history as a possible source of ideas useful in warfare” (camouflage, armor, etc.).

Photographic gallery exhibits became more common with time, and the Department occasionally has been involved with those in a major way. In 1970–1971, Zweifel was Curator-in-Charge for “Adaptations of Amphibians and Reptiles,” a three month exhibit featuring nearly 100 large color photographs by Nathan Cohen, plus a movie on snake locomotion that had been made at the New York

Zoological Park under supervision of James Oliver. In 1985, I was Curator-in-Charge for "Mountain of the Mist," a photographic record of American Museum participation in the 1984 Expedition to Cerro de la Neblina on the Venezuelan–Brazilian border.¹⁷⁰

The foregoing are examples of exhibition responsibilities that are usually unexpected and nearly always assumed on very short notice. However, there has been another kind of special exhibit usually conceived within the Department. For decades it was thought desirable to have an exhibit of the local fauna, which in later years became disassociated from the Reptile Hall. By 1905, there was a display of amphibians and reptiles from the New York City area in the east tower room and also two guide leaflets of the local fauna (Ditmars, 1905a, 1905b). I do not know the fate of this exhibit, but Noble's annual report for 1921 states that

An exhibit of reptiles and amphibians found within fifty miles of New York City was inaugurated late in the season. The case now includes twenty-nine specimens. This is only a beginning. We hope to have the entire fauna represented by the end of next year. In conjunction with this exhibit, steps have been taken to prepare a handbook of the reptiles and amphibians of our region.

Extensive fieldwork for the anticipated handbook was carried out in the spring of 1922, including securing important life-history data (e.g., on *Hyla andersonii*) and numerous photographic records. Noble never was to find the time for completing his handbook, but he published a simple distributional list of the local herpetofauna in the Museum's Guide Leaflet Series (Noble, 1927g, 1929e).

The above exhibit was later "installed in an alcove provided at the far end of the [Reptile] hall" (Noble, 1925f: 383). Although it is not indicated on a diagram of the 1927 Reptile Hall (fig. 31), it may have been situated slightly outside the area shown. The space probably was appropriated for something else at a later time, but a local exhibit surfaced again in 1937, according to the departmental report (Noble, 1938m):

An exhibit of reptiles and amphibians of the New York City area was installed in the ambulatory of the Roosevelt Memorial Building, first floor. The mounted specimens were supplemented by a series of colored transparencies which show certain interesting features in the life history of the different forms. The exhibit is not yet complete but will be added to as material becomes available.

In 1959 or 1960, Zweifel submitted an outline for "a new exhibit proposed to replace the present exhibit . . . of the New York City region." That was not acted on and the "display of New York State amphibians and reptiles" was dismantled in 1967–1968 "to make room for exhibits associated with the [Museum's] Centennial Year Celebration."

It may only be my wishful thinking that exhibits of the local fauna should still have a place in the Museum, even if ready availability of field guides and other literature do make such exhibits less compelling. My own solution when being queried about local fauna often is to direct a person to the book by Research Associate Michael Klemens (1993).¹⁷¹ Still, it *would* be nice to be able to show some realistic mounts.

CURATION AND GROWTH OF THE HERPETOLOGICAL COLLECTIONS

Global collections of amphibians and reptiles tend to be smaller than those of some other groups of organisms, the reason being that a disproportionately large percentage of the living species (very roughly 12,000 worldwide) comprises tropical animals that are rare and/or difficult to collect. It follows therefore that building a major collection of such animals is not without problems. But the same also is true of the curation and maintenance of the collection. Once the Department was founded, every Curator or

Chairman in charge has pestered every Director or Provost. As Director Lucas wryly observed to Noble in 1920,

I have read the statement and recommendations accompanying your budget with much interest. The condition of the collections illustrates the well known fact (to Directors) that it is much easier and pleasanter to acquire specimens than to take care of them.¹⁷²

Much of the following overview about the care and growth of the herpetological collections is derived from the departmental annual

reports, which are referenced by the year(s) covered rather than publication date; a few of the earlier reports have more information in the original typescript drafts, which were sometimes shortened for publication. My use of one of these manuscript drafts rather than a published report prior to 1942 is not always stated in the text following. Detailed archival departmental reports were prepared for Herpetology starting in 1942 (see under Archival Sources and Acknowledgments), and from that time on only the archival (unpublished) departmental reports have been used unless otherwise indicated; published annual reports since 1941 are not as useful. As will be seen, some of the history is spotty, because curators had neither time to document procedures thoroughly nor the realization that their daily actions would be of eventual interest. Nonetheless, I wonder if any other herpetological collection has left such a tantalizing trail for a Museum historian.

The Museum's first herpetological and other collections were stored (and exhibited in part) at the Arsenal Building in Central Park from 1870 until after the Museum's first building was opened in late 1877 (fig. 42). According to Gratacap (1900–1908, chap. 4: 27), the reptiles “remained for some years longer at the Arsenal, which became a sort of Annex to the Museum.” But in 1885, owing to the “manifestly unsafe situation” of specimens still stored at the Arsenal, the collections were moved to temporary storage in the basement of the new Museum; the specimens in alcohol “received special attention” in 1886–1887.

Except for mounted specimens or skeletons, the early specimens were, as far as we know, only in glass jars, which were sometimes in short supply. In 1887, the herpetological specimens were in “the upper hallway . . . out of the public sight,” and

When the Maximilian collections in alcohol (fishes and reptiles) were removed to new ground-stoppered bottles, the emptied glass jars were stored in the cellar [to be used for] “second rank” specimens . . . adding fresh alcohol. (Holder, [1888]: 21)

In 1889–1890, “Owing to the lack of glass jars, for the proper distribution and exhibition of the specimens,” newer collections remained “stored in bulk as originally received.”

These early herpetological specimens were under the care of Curator of Zoology Joseph

B. Holder, who died in 1888. Responsibility for the collection temporarily passed on to others, including Joel A. Allen, Curator of Birds and Mammals (Gratacap, 1900–1908, chap. 4: 33). Most importantly, William Morton Wheeler cared for the herpetological collections in the Department of Invertebrate Zoology from 1903 through 1908. It may be as simple a matter as alcohol storage that caused the amphibians and reptiles to be turned over to the Invertebrate Department. However, Wheeler took the charge seriously, even taking on exhibition projects and acquiring some new material. But little more was to be said about the herpetological collections until the formation of a new department that would give its attention to them, starting in 1909.

EVOLUTION OF CURATORIAL PROCEDURES

Constant attention is necessary for any large collection of alcoholic specimens . . . Few realize the great amount of purely mechanical work which must precede any technical or exhibition work. (G. K. Noble, 1923p)

After 1909, the first herpetological curators and their assistants were starting a new department and feeling their way. Dickerson almost certainly had been influenced by her prior exposure to David Starr Jordan's collection methods at Stanford (and possibly she earlier had seen something of the Museum at University of Michigan during her student days there), and clearly at the American Museum she had interchange with colleagues in Ichthyology (especially Bashford Dean and John Treadwell Nichols). Noble as well certainly absorbed collection methods during his formative period as a student assistant with Thomas Barbour at Harvard's Museum of Comparative Zoology, and he also became familiar with Stejneger's operation at the United States National Museum when stationed in Washington, D.C., near the end of World War I. But once started, the curators seemed only occasionally to look to other institutions for guidance.

Knowledge of what was done before, even very fragmentary, sometimes sheds light on current collection problems. I have arranged the subject matter in the following order:



Building of the American Museum of Natural History as it looked in 1878 (AMNH Photographic Archives 471). “The architecture of the building was hardly striking . . . a bold relief, and a certain incongruity between it and its surroundings heightened its conspicuousness . . . An impressive solidity conjoined with a dwarfing sense of incompleteness at first disappointed the visitor, until he realized that exterior effect had been exchanged for interior convenience, and that this edifice only represented a fraction of the final colossus it foreshadowed” (Gratacap, 1900–1908, chap. 3: 25–26). Compare with figure 17.

Collection Organization
 Jars, Crocks, and Tanks
 Type Specimens
 Osteological Collections
 Jar Labels
 Specimen Tags
 Cataloguing by Hand and Typewriter
 Renovation of Bound Catalogues
 Cataloguing by Computer
 Location of Department in Museum
 From Oral to Written Tradition

COLLECTION ORGANIZATION: The early collections of amphibians and reptiles in the Department of Ichthyology and Herpetology

were organized according to the taxonomic arrangements in George Albert Boulenger’s great series of British Museum catalogues (Boulenger, 1882–1886)—a method also in early use at the California Academy of Sciences and for a longer period in the Museum of Zoology at the University of Michigan.¹⁷³ Inserting taxa described since Boulenger had to be done by arbitrary assumptions of taxonomic place.

According to the archival report for 1918, a new set of cases was installed and the *species* were rearranged in alphabetical se-

quence within genera. In 1929–1930, the *genera* were arranged alphabetically under the families, and this alphabetical arrangement of genera and species has been carried forward to the present.¹⁷⁴ Sometime later, the *families* also were arranged more or less alphabetically.

Jars of amphibians and reptiles initially were arranged on shelves, possibly in closed cabinets early on and most likely on open shelves as the collection grew. This is still the norm for such collections, but in 1919 a new method was initiated under Dickerson, completed by Noble, and has continued to this day.

1919: A new tray system of storage has been inaugurated by which accumulation of dust on the collections is avoided and the species of a given genus are kept and handled together.

1920: A new tray system for the storage of study material was inaugurated towards the close of last year, and the entire amphibian collection is now installed in trays, which facilitate rapid handling.

1922: The lizard collection was moved to the new storeroom, arranged in the new trays, shelved and labeled. The collection is now placed systematically in dust-tight cases.

The snakes (“spread out to cover the shelves formerly occupied by the lizards”), turtles, and crocodilians were done later, apparently without recording of the event.

Cleanliness and efficiency of handling were the reasons given for the new system of trays in closed cabinets, but just as important (even if not then realized) was the protection from light sources, even the weakest of which will fade specimens with time. (In recent years, the partitioning of collections in closed cases seems to make fire inspectors happy.) This system was maintained throughout the 20th century despite the initial expense of trays and metal specimen cabinets. The cabinets or “piling cases” are mostly 3-door museum cases of the sort used for other kinds of collections, but the trays are different. The wood trays originally seem to have been made in the Museum carpentry shop, but in later years were put out to bid to specialty shops. A pair of trays fits side-by-side on half-inch plywood shelves, which replace the standard wide shallow trays that are commercially produced and used for such dried preparations as turtle shells and skeleton boxes.

JARS, CROCKS, AND TANKS: The glass-stoppered museum jars mentioned in 1887, especially the large sizes, were still commonly used in the collection when I arrived in 1968, although over the decades a variety of other jars had made their appearance, the most useful of which were the glass bail-tops that sealed with a rubber ring. Even these two types of jars made for a motley lot, as glass-stopper tops had long been separated from the jars to which they had been mated, and rubbers of several different thicknesses were required for different generations of bail-top jars. Early screw-on metal lids rusted if water or traces of formalin got under the liner, and the lid liners either shrank or, in the case of some black rubber ones, expanded and leached color into the alcohol. Hard plastic “Bakelite” lids were known to crack easily if over tightened, and they have not been used in the AMNH collections (although they were tried at the MCZ).

Eventually, a slightly flexible plastic screw-on lid became available, one less likely to break and that would not “back off” after tightening. Various-size jars taking such lids had become the standard by 1998, with most other types of jars having been culled from the collection. Glass bail-top jars, being made of heavier glass and least likely to allow evaporation (if properly sealed), were retained for the type-specimen collection. The first problem with the by-now-ubiquitous plastic lids was detected in 1998, when lids on jars exposed to room (fluorescent) light for several years were found to have become brittle and cracked, although similar deterioration was not found inside light-proof cabinets.

Earthenware crocks probably were in very early use for larger alcoholic specimens that would not fit into glass jars, although the first mention of their use that I noted was 1923. A 1921 reference to “tanks” indicates that larger containers of wood and/or metal were probably made for the largest specimens. A very large wooden “coffin,” interiorly lined with metal to hold alcohol, has seen over half a century of use in the department (it was rehabilitated in fiscal year 1972–1973, and again in 1995, when a high-density polyethylene liner was added).

The crocks were hard to keep sealed, and

alcohol levels needed frequent checking. In 1945–1946, Bogert predicted that

Collections now stored in crocks could be handled more conveniently, and with much less expense in the long run [he was thinking of alcohol evaporation and employee time], if a number of monel metal tanks designed to fit in a frame on castors were made available.

Bogert still had found “no suitable commercially available container” by 1956–1957. Commercial stainless-steel tanks later became available, however, and hundreds of crocks were finally retired, starting about 1975. Nylon-mesh bags are used in the tanks to segregate series of smaller specimens, which allows easy retrieval. A total of 126 steel tanks were in use by 1998, mostly being $36 \times 15 \times 15$ inches but including several larger ones ($36 \times 24 \times 23$ inches).

TYPE SPECIMENS: Types were shelved in the main collections until 1942, when Bogert removed the primary types (240 at that time) and sent them to a storage site in New Jersey as a wartime precaution. They were returned to the Museum in 1944 and, if not kept apart then, were at least segregated from the main collection by the early 1950s.

The *primary* types (holotypes, cotypes or syntypes, lectotypes, and neotypes) have been sequestered ever since. There were more than 700 primary types listed by the end of 1998.

Paratypes, when known, are identified in the cataloguing process and on jar labels, but otherwise they have never received special treatment. Paratypes are very useful for comparison with other specimens to be identified, or for trying to reconstruct an author’s concept of a species, but they lack the mandated nomenclatural value of the primary types.

OSTEOLOGICAL COLLECTIONS: Skeletal preparations were part of the collections from early on. Many preparations were made from animals donated by the New York Zoological Society, from Dickerson’s time to the present. The osteological collection is primarily a synoptic one, and lending has been discouraged for this reason and because of the fragile nature of many preparations.

Excluding preparations from zoo specimens, the osteological collections usually have been increased mainly for immediate research needs rather than as curatorial rou-

tine. There have been peaks of such research activity, as in 1919–1920, when Noble and Camp were actively involved in anatomical studies and when Dickerson or her assistants were preparing specimens for work on Lower California and the Southwest:

1919: Considerable attention has been given to the department’s osteological collections. The salientian skeletons now number 98 (28 genera and 58 species), three-fourths of which have been prepared by the Schultze technique during the present year. It is possibly the largest collection of salientian skeletons in America as regards the number of different forms. It appears to be second only to that of the British Museum (which possessed in 1916 about 200 specimens of about 50 different genera), and to supplement that collection in including a number of genera not represented there. Dissections of lizards, representing many species of 12 iguanid genera, to show hyoid and shoulder girdle have been prepared in connection with the work on Lower California and the Southwest. Ten lizard skulls have been prepared. In connection with the research on the myology and osteology of lizards a considerable series of skeletons suitable for exhibition is in preparation.

Noble started experimenting with methods of clearing and staining during his student days at Harvard, and he had gained considerable experience by 1919 and 1920:

1920: A study of the bony and cartilaginous structures of reptiles and amphibians presents many difficulties, especially because of the small size and fragile nature of the material. Rapid strides have been made during the year in perfecting a technique by which specimens of any size may be depigmented, decolorized, and cleared by a single process. Differential stains have been used with success to bring out more clearly the bony structures. This clearing method as now perfected is so much simpler, quicker and more exact than the various skeletonizing methods that there can be no doubt as to its future usefulness. During the year, one member of the Department has cleared without serious interruption to his other work forty-four salamanders, three frogs, and fifty-seven lizards. The total expense of clearing these hundred and four specimens did not exceed ten dollars, which is about half the price demanded by most technicians for skeletonizing a single specimen. The great advantage of the clearing over the dissection method is the absolute freedom from loss, breakage, and disarticulation of parts.

By the end of the century, Noble’s cleared-and-stained specimens had lost most of their color but are available for restaining. The longevity of cleared-and-double-stained specimens produced in later years remains to be determined.

JAR LABELS: The first specimens had only

jar labels, which, although no longer the source of *primary* data, remain useful to this day. At least some of the early jar labels were probably glued to the outside, but inside labels were mentioned in Dickerson's archival draft report for 1918, when it was noted that for the identified collections, "not quite all the old labels inside and outside the jars have been removed and renewed." Probably neither kind of label was very satisfactory.

Occasional jars with labels pasted to the outside remained in the collection virtually to the end of the 20th century, part of the legacy of Assistant Curator Ortenburger, who was employed in 1922 and 1923 and who may have brought some ideas from Ruthven's collection at the University of Michigan:

1922: Mr. Ortenburger has been experimented with celluloid varnishes to be utilized in coating the labels on the glassware. His experiments have proven very satisfactory. It is expected that the repeated relabeling of jars will soon be eliminated.

By the 1950s, sturdy "Resistall-treated" (a formaldehyde process) paper was available that could be typed on and that was tear-resistant after immersion in alcohol. It would replace the use of all other labels. The earliest Resistall-treated labels had printed inscriptions for locality, collector, and date, and were intended to take full data for a single locality. When consolidation became mandated because of overcrowding, I drafted (in 1979–1980) new amphibian and reptile labels in two sizes (for small and large jars) that allowed entries for multiple localities in single states, departments, provinces, or territories (countries have always been kept separate).

SPECIMEN TAGS: Dickerson used metal field tags on her Arizona Expedition in 1912. Individual number tags started to be routinely attached to catalogued specimens in 1913, when Dickerson reported that "specimens are being renumbered with block tin tags so that each will bear its individual number." Much of this work seems to have been completed in 1914, when it was noted that the "collections of lizards, snakes, turtles and crocodiles (some 5,000 specimens) are now renumbered."

The introduction of individual specimen

tags was a major curatorial advance in tracking, citing, and safeguarding data on specimens. But the use of metal brought the problem of corrosion, which was to plague the Department through the rest of the century. The dilemma became evident by 1918, several years after the tags were introduced, and Arline Field called the matter to Dickerson's attention:

Miss Dickerson:

... All tagging is being held up awaiting investigation of the corroding of the tags. Mr. Beers reports to Dr. Lucas that a chemist must be engaged to try to solve the problem. If nothing can be done, we may have to replace all of our tags with parchment. It is a very serious matter and must not be delayed. Can you look into the matter that it may be rushed?¹⁷⁵

I find no other comment in the archives, but K. P. Schmidt, who witnessed this difficulty first at the American Museum and later at Field Museum, summed up the problem:

A recurring problem in museum technique is offered by the necessity of numbering specimens preserved in alcohol, formalin, or other liquid. The use of metal tags for this purpose has been general, pure tin being by far the best material available. Metal tags are, however, subject to corrosion in formalin solutions or even in alcohol to which formalin specimens have been transferred. There is some difficulty in securing tin of uniformly pure composition, and even a slight impurity may greatly activate the process of corrosion. (Schmidt, 1932)

Several kinds of tin tags were tried over the years, being mostly rectangular but with one series of oval ones, none of which were completely satisfactory. A heavy tag said to be of Monel metal¹⁷⁶ was much better, but it was cut so long that technicians and curators folded the tags over, which saved space but caused the tags to catch in an annoying tangle; even these tags, however, seem occasionally to corrode, and they also tend to overwhelm very small specimens. The best metal tag seems to be the last one used, ending with number 77801 in the amphibian series and 102325 in the reptile series; these tags are about 8 × 33 mm and are of a shiny, very flexible alloy whose composition is not recorded.

The better metal tags would have been relatively expensive. That and perhaps a desire to save time presumably were the reasons why the Department started individually tagging only one or a few animals in series of

specimens. C. M. Bogert advised me (from retirement) that

It was impossible to obtain specimen tags during the war years, and we had to tag lots rather than every specimen, which was unfortunate to say the least. I'm pleased to note that you've been getting tags on all specimens.¹⁷⁷

However, the practice of leaving some specimens untagged started in volume 1 of the catalogues, long before Bogert had been hired.

Schmidt (1932) had adopted the use of "chemical proof" paper for museum tags at the Field Museum, citing its earlier use by Carl H. Eigenmann (at Indiana University) and its subsequent use at Harvard, Berkeley, and the University of Oklahoma. But the use of numbered fiber tags was a long time in coming to the American Museum. Zweifel (personal commun.) campaigned for such tags after his arrival from Berkeley. Bogert finally requisitioned fiber tags in October 1966, starting with number 77802 in the amphibian series and 102326 for reptiles, which numbers succeeded the last metal tags in stock. The last metal tags were still being used for reptiles on my arrival at the American Museum in 1968, although most other institutions had long since switched to fiber ones for both collection use and field tags.

Fiber tags by and large have been a decided curatorial advance, since they do not corrode and do less damage to specimens. Nevertheless, they are not completely trouble-free, being sometimes stamped too lightly and sometimes subject to destruction by molds (especially if attached to poorly preserved specimens [e.g., road kills] that remain too long in cheesecloth or other field wrappings).

CATALOGUING BY HAND AND TYPEWRITER: Early cataloguing left something to be desired, at least by present standards. Reidentification of the Maximilian collection was started in 1885, "with reference to public exhibition, and the final cataloguing of species," and a "permanent record" of reptiles was completed in 1886–1887. Presumably this first cataloguing was done on cards; in any case, nothing is known of their fate (although the book catalogues purchased with the Maximilian Collection still exist).

There seem to have been at least three primary card catalogues of the herpetological collections made in the early Department of Ichthyology and Herpetology. These have not survived either.

1910: Work has progressed on a reference catalogue of the collection of amphibians and reptiles which is to be moved into a well-equipped fifth floor room for greater convenience in the work.

1913: A permanent reference catalogue has been prepared for the complete collection and there has been put into working order also a catalogue of new species and genera. [The last being the first taxonomic catalogue, this work having been done by Stella R. Clemence].

1914: A catalogue has been made covering the new numbering [see above under Specimen Tags], and the new numbering has been entered in the original accession book to prevent any confusion which might possibly arise in later years from this renumbering of specimens.

1915: [Regarding the resignation of S. R. Clemence, the] reptile study collection with its present admirable arrangement and accurate catalogues stands as a credit to her two years of painstaking labor.

1916: The reference catalogue for reptiles has been completed to date, and a new locality catalogue has been instituted.

1917: . . . all useless data and material [are] constantly being discarded or reorganized to avoid confusion and to make the Collections more accessible . . . In connection with this work, an old set of catalogue cards was checked up and discarded.¹⁷⁸

1918: During the first of the year the entire general batrachian collection was recatalogued and rebottled . . . a great many of the Study Collection cards have been recopied on account of additional information and changes in identification . . . the catalogues have been changed and used so much in checking and arranging and reidentifying of the Collections that it would be best to make a complete new set of cards and use the old one for the basement . . . Our other work on the catalogues was the complete checking of an old card catalogue which we wished to destroy as it was of no value and might prove to be confusing.¹⁷⁹

"Confusing" probably was an understatement, but recognition of the problem led finally to a system of book catalogues starting in 1920. Since then, card catalogues have been supplemental to the bound book catalogues.

1920 (archival draft): Two new and very necessary catalogues have been commenced. The first is a species [card] catalogue, giving under the names of each species the data for all the specimens of that species at present in the Museum. This [card] catalogue has been completed for the lizards and snakes. The second and more important catalogue is a book system designed to replace the old card catalogue in which all the collections up to this year had been recorded.

It was found that the cards were subject to loss and error. The book system has been found to be the most satisfactory method in other institutions and it would have been only a matter of time before it would have been adapted here. During the year, all the amphibian records have been transferred to the new books.

1921: The preparation of a complete reference catalogue to the study collections continued throughout the year. Miss Barnett continued the transference of data from the old card catalogue to the new catalogue books.

Grace Tilger attempted to trace aspects of data entry in the first bound catalogues and prepared at my request a summary of her conclusions that were recorded in the annual report for 1988–1989, here extracted:

Miss Barnett's clear printing can be seen in the Amphibian catalogues in numbers 1–11300, 11501–13055, 13151–13300, 13351–13927, 13951–14292, and a few other entries to *ca.* 14401. She made entries 1–930 in the first Reptilia catalogue and also scattered entries in vol. 2 to about no. 20010.

Miss Barnett was followed by and/or assisted by Miss Ellen E. Nelson, who was around from [July 10, 1922 to May 31, 1925]. After about 1922 or 1923, many different people made catalogue entries—some very good, some awful—there seemed to be no clearly established procedure for entries. William G. Hassler started working in the Herpetology Dept. early in 1924 [at age 17] and stayed until May 31, 1937. His many entries are scattered through the earlier amphibian catalogues (e.g., 38090–38233, 38440–38497 etc.)

A geographic card catalogue was reinstituted in 1937, with WPA help. The supplementary taxonomic card catalogue thereafter was maintained to the time of computerization, although the geographic index was less well kept up and was discontinued a few years earlier.

In theory, the bound catalogues instituted a permanent system of data entry, not to be discarded simply because of changes in identifications or data. The system, however, was not without its problems. Entries sometimes were left blank after tags had been assigned, waiting for one reason or another, and ditto marks were sometimes assumed rather than entered. Furthermore, name changes often were updated on the taxonomic cards and not in the bound catalogues (which was not a problem before computerization, when the taxonomic cards were primarily used for locating specimens and the original catalogue entries were used mainly for reliable specimen data).

I found a worse problem not long after my arrival in 1968, however—included names were often erased and overwritten in the book catalogues, causing loss of the original determination and sometimes leading to unwarranted assumptions about locality data or type status. After 1969 or 1970, all subsequent changes or data interpolations were made in pencil and usually dated and initialed; interpolation of data (e.g., addition of a state or province to locality) was from that time to be put in square brackets to differentiate what had been supplied by the collector.

RENOVATION OF BOUND CATALOGUES: By the early 1970s, it was becoming obvious that the older of the battered specimen catalogues would not last for many more decades. They had been sent for rebinding one or more times, with the attendant and terrifying possibility that they could be lost in transit, and transfer of the data to an electronic database was only an idea in the indefinite future. Also, by 1980, the last catalogues were filling up, so interim solutions had to be found for preservation of the old catalogues and provisions for new ones (as documented in the archival reports for 1979–1980 and 1980–1981).

The old catalogues were professionally copied on 35mm. microfilm and then printed by xerography on bond paper at about 80% of original size, yielding two bound volumes (labeled “A” and “B”) for each original volume (because the reprints use only one side of a page). New catalogue pages were drafted, printed, consecutively line numbered, and placed in specially manufactured loose-leaf (post) binders, the idea being that a finished volume would be bound after all the handling (bindings of older volumes wore out before the last entry had been made). The reprints and the new pages were “legal size” (8 × 14 inches), allowing copies to be duplicated on regular photocopy machines. The original book catalogues went to the Departmental Archives.

CATALOGUING BY COMPUTER: The department watched with interest the pioneering efforts of other herpetology collections that shifted to electronic databases in the late 1970s and early 1980s. However, the American Museum system, with an efficient tax-

onomic card index and a somewhat less up-to-date geographic index, was functioning well for most purposes; computerization was thought to be inevitable but not a pressing concern. After about 1982, it became increasingly more clear that technological advances in hardware and database software would allow the capture of catalogue data electronically on a stand-alone system to be controlled entirely within the Department, thus avoiding the mainframe or minicomputer approach that was being used elsewhere with varying success. Starting in 1987, serious consideration was given to a plan for computerization and, in order to stay on track despite the certainty of distractions and postponements, a new section was devoted to collection computerization in nine consecutive annual reports, starting with initial planning in fiscal year 1987–1988 and finally ending after completion in 1995–1996. Actual transfer of the collection and invoice data to electronic format was accomplished during 1992–1995 under the direction of Linda S. Ford. Departmental archival reports describe the history of the computerization project and subsequent database activities.

LOCATION OF DEPARTMENT IN MUSEUM: I have not tried to track all the periodic relocations of Herpetology within the Museum buildings, but the offices and collections have moved around according to occasional entries in the annual reports. The collections were sometimes separated from the curators, always an unfortunate circumstance.

In 1910, the collections were “to be moved into a well-equipped fifth floor room for greater convenience in the work.” In 1913, there was a “new fireproof herpetology storeroom in the basement of the building furnished after the manner of the new storeroom of the National Museum.” In 1937, the year after Bogert’s arrival and several years after the splitting of Herpetology and Experimental Biology,

The entire amphibian study collection [was] moved from its old quarters to the basement of the African wing. At the same time the laboratories of the Department were moved to the fifth floor of the same wing.

In 1939, the departmental offices were moved from the fifth to the first floor, with a

storeroom adjacent to the offices for collections awaiting investigation; other collections were housed in the basement. In 1941, there was the “moving of the entire collection of 60,000 reptiles to more suitable quarters.” The 1939 move to the “first floor” must have been into the old power house (building 17; see fig. 17), about which Bogert complained bitterly in 1942:

Quarters which once housed a powerhouse, at present time are wholly unsatisfactory as a result of the construction of partitions (instead of walls) separating the various offices. Privacy of work under quiet conditions is almost impossible . . . Furthermore, the open area above the walls makes it impossible to open windows on both sides of the building without setting up currents that carry in dust from the coal pile on one side or the incinerator on the other, while the antiquated construction of the transoms permits the continual passage of dirt from the outside whether windows are open or not. The result of these conditions makes it impractical to leave papers, specimens or material exposed on tables, even over night, unless they are cleaned before future use. Maps and drawings can be handled or placed on tables only after furniture has been washed immediately in advance, thereby increasing the amount of time required for such labors.

The present system of having offices on one floor, and storage collections on another floor in an adjacent wing with a freight elevator that can only be used by special arrangement is another serious inconvenience . . . Storage space is urgently needed for 150 odd crocks and a tank at present time stored in the hallway leading to the Powerhouse in the first floor.

Bogert complained about such things for the better part of a decade. The situation was finally resolved with construction of building 1A, which was erected flush against the east side of old building 1 (fig. 17). The anticipated new quarters *and* the prospect of a second curatorial position were viewed with enthusiasm in Bogert’s report for 1953–1954. Richard G. Zweifel filled the new position at the start of fiscal year 1954–1955, in time to help move in 1955. The Department occupied first- and second-floor mezzanines, with ample office and laboratory space on the upper floor and collections on the lower. As Bogert summarized in his report for 1955–1956,

The end of The Year of the Great Move finds the Department of Amphibians and Reptiles in far better circumstances than in the past, due in large part to the vastly improved physical facilities provided by the new quarters. With the amphibian and reptile collections both concentrated in the same room, and in

easy access to the offices, routine curating and consultation of the collections have been greatly facilitated . . . The construction of a new large cage adapted for use in experiments on thermal relationships of reptiles was completed; the Department now has two such identical cages, which will permit better experimental control. We anticipate the installation before the hot summer months of promised Venetian blinds and forced-draft ventilation, features that will help to alleviate one of the last remaining bars to more efficient service on the part of the Department staff.

The blinds helped, but the forced-draft system was a dirt mover; window air-conditioners were installed in the secretarial office-library and in the working laboratory before 1968 and were added to the curatorial offices in the 1970s, when the collection room also received a degree of air conditioning.

The new spacious lodgings were adequate for nearly a quarter of a century, after which space became cramped because of a larger staff and a greatly increased collection size. The solution then was to compete for and win a linear series of poorly ventilated, second-floor rooms in the adjacent side of building 1, entered by knocking through the wall of 1A and installing a doorway through half of one of the walled-up, original large windows in building 1. The new Herpetology annex was occupied after two stages of construction and other delays, with the frogs being moved there starting in 1985 and the salamanders and caecilians much later in 1996. The amphibian and reptile collections had been divorced once more.

FROM ORAL TO WRITTEN TRADITION: It is regrettable and may seem odd that a manual of collection procedures was not drawn up by the staff early in the Department's history. I suspect that, if the notion occurred, other pressing work always seemed more important. Collection traditions, whatever they were, were passed back and forth between curators and their trusted assistants, including Schmidt and Noble (who started as assistants) and also especially Stella Risley Clemence (1910–1915), Arline Field (1914–1918), Madolin Clara Barnett (1918–1922), William Hassler (1924–1937), Carl Frederick Kauffeld (1930–1936), Bessie Matalas (1941–1954 [m Max Hecht]), George W. Foley (1959–1989), John Healy (ca. 1947–1973), and Edward Teller (1973–1984). This list is by no means complete.

Assistant Hassler and Senior Technician Foley filled similar positions. Each one had great familiarity with the collections, field experience, and acquired technical skills. Hassler, for example, became expert in field use of Noble's wax-infiltration system, and Foley could coax the best possible prints from an aging sound spectrograph machine. Each person in turn supervised other contemporary support personnel. Both Hassler and Foley were spread too thin, especially Hassler, who assisted Noble in the laboratory and in the field in two departments, and who led expeditions to the Dominican Republic. Part of the interval between Hassler's resignation in 1937 and the hiring of Foley in 1959 was most importantly filled by Bessie Matalas.

Times were financially difficult in the Museum throughout most of the 1940s, when, except for a few years of curatorial help from James Oliver, Bogert managed the collections with minimal help, most of which was transient (with a few notable exceptions). During this period especially, the departmental secretary assumed new importance. Some office continuity between Noble's and Bogert's administrations was provided by Herpetology Secretary Esther Alice Stetzer (m Langslow), who had started work in 1930 but left for military service in March 1943 and did not return to Museum employ. She was replaced in September 1944 by Irene Madeline Shamu [m Rodolfo Ruibal], who resigned to move out of state in July 1954. Departmental records show that Scientific Assistant Bessie Matalas and Secretary Irene Shamu collaborated effectively to run the Department of Herpetology whenever Bogert was away. Their presence permitted him to take long field trips and even to augment his salary by taking vacation to teach in summer sessions (1942, 1945, 1947) at the University of California at Los Angeles. Matalas even represented Bogert at meetings of the old Council of the Scientific Staff. Bogert's chairmanship and his research owed much to the efficiency of his staff, small as it was.

After a few short-term secretaries, Secretary Irene Shamu was replaced in January 1955 by Mrs. Margaret S. Shaw, who was to serve three chairmen (Bogert, Zweifel, and myself) over a period of 37 years—the departmental record for length of service in any

rank. Mrs. Shaw continued a high level of office efficiency, and she worked effectively with a succession of scientific assistants to keep the Department's bibliographic project ongoing. She assumed the title of Assistant to the Chairman when the departments of Herpetology and Ichthyology were administratively merged in 1987, but, except for training new secretaries for Ichthyology, Shaw confined herself to keeping Herpetology functioning as an efficient unit. She retired at the end of January 1992, a year before Herpetology and Ichthyology were again separated.

The specimen catalogues indicate that curatorial procedure suffered owing to periodic loss of oral traditions, which underwent a particularly long period of fragmentation after Hassler's departure. Traditions not somehow passed on by Bogert were lost or had to be relearned. Foley, who arrived in 1959, benefitted from the presence of an active assistant curator (Zweifel), who was himself learning AMNH procedures while introducing new ideas and practices into the daily routine. By the time of my arrival in 1968, a set of procedures had become established that were best known to Foley, who helped me to establish the first AMNH procedural manual two decades later.¹⁸⁰ The compelling rationale was to document established methods and procedures before eventually converting to an electronic database, but the Herpetology manual also served as a convenient model for the first Ichthyology manual in 1993, after such documents were finally mandated by the Administration.

COLLECTING LEAFLETS AND OTHER PROPAGANDA

Amphibians and reptiles are perhaps the least known of all vertebrate animals. Collecting, especially in little known regions, is almost certain to yield important results. The technique of collecting is simple and the preservation of the specimens inexpensive. Collecting is merely an approach, and often an indispensable approach, to the study of reptiles and amphibians. Considerable pleasure and, frequently, valuable scientific data may be obtained by collecting these interesting creatures. (G. K. Noble's preface to a 1937 collecting leaflet)

In one of her last official letters for the Department, only a few weeks before she was institutionalized, Mary Dickerson ac-

knowledgeed receipt of 131 preserved specimens from northern Colombia:

This is to acknowledge your letter from Quibdo and the very interesting collection. It is satisfactory that it represents one locality. I have always thought that for any zoological survey work a thorough combing of one spot even though that spot were small was of more scientific value and interest than scattering specimens from a large territory.¹⁸¹

Importantly, in addition to promoting Departmental fieldwork and acquiring the fruits of large Museum expeditions, Dickerson encouraged collecting by individuals from the outset. She seemingly had a knack for such persuasion even before coming to the Museum—witness her wide acquisition of North American anurans for *The Frog Book* (Dickerson, 1906), resulting in a collection said by Osborn (1911: 65) to contain all but one of the species then known from the United States.

Sometimes there were elaborate endeavors to enlist individual collectors on a grand scale, as in 1918:

Propaganda:—In an effort to enrich the Study Collections and to obtain material for exhibition purposes, about one hundred sources of herpetological specimens have been reached by letter. Towns in Utah and Nevada have been written to through the medium of the Postmasters and School Principals, asking for frogs and toads. In several cases most pleasing results have been received. New York, North Carolina, Florida, Texas, Arizona, New Mexico, Nevada, California, and Washington have been covered in an appeal for poisonous snakes of these regions.

In special sections of the Herpetology letter files we have reorganized the filing so that we can more easily find special letters dealing with propaganda work and with sources for material in all parts of the world.¹⁸²

It also occurred to Dickerson that the Boy Scouts might be a swell source of specimens, hence her 1919 letter to the head Scoutmaster:

We should like to interest Boy Scout troops in collecting . . . especially in the Southern and Western states . . . In return for specimens we could give information . . . The collecting instinct, which is so deep an element in boy nature, would in this way be of real service to science, and the knowledge of the local animals would equally benefit the boys concerned.¹⁸³

Dickerson's attitude that the young collection needed to diversify and build rapidly from *all* sources was imparted to, and natu-

rally shared by, her young assistants, especially K. P. Schmidt and G. K. Noble. Schmidt and Noble seem to have been the ones most responsible for initiating printed leaflets for departmental outreach. One of the collecting leaflets was prepared by Noble, who followed up on Dickerson's scheme to enlist the collecting instinct "in boy nature." In 1922, Noble wrote a closely spaced, 2-page letter to the editor of *Scouting*, a magazine for the Boy Scouts of America:

The American Museum of Natural History, in continuing its survey of the salamanders of the United States, has found the Boy Scouts very efficient co-workers. The Museum is planning to construct several new groups illustrating the life histories of these forms, and is anxious to secure specimens for study and exhibition. It has been brought to my attention that you might be willing to encourage the Scouts to assist in this work by publishing a note in *Scouting*. We would be willing to pay the shipping expenses of any salamanders the Scouts might secure, and would be very glad to send identifications and information in regard to the life histories of the trophies. The work would be truly cooperative since both Boy Scouts and Museum would benefit.

Salamanders should be familiar to all Boy Scouts. It is very easy to collect salamanders. The chief methods may be outlined as follows:¹⁸⁴

What followed was a set of instructions virtually identical to those in a leaflet (no. 3 below) printed shortly thereafter.

I have identified six printed versions of Herpetology's *Suggestions to Collectors* leaflets, as listed below and shown in figures 43 and 44. Although these leaflets lack indication of authorship and are not explicitly dated, archival sources¹⁸⁵ allow rough assignment of dates and authors or revisers.

1. 1919. Suggestions to collectors of reptiles and amphibians. American Museum of Natural History, Department of Herpetology, 1 quarto page. (Most likely authored by Noble and Schmidt in collaboration; additional instructions typed on back at some later date.)
2. 1922. (Same title as above.) [AMNH] "Collector's leaflet no. 2, 4 octavo pages, unnumbered. (Revision of above by K. P. Schmidt, to add the additional instructions typed on the back of a surviving copy of leaflet no. 1.)
3. 1922. Suggestions for collecting salamanders. American Museum of Natural History, Collectors leaflet no. 3, 3 octavo pages, unnumbered. (Prepared by Noble, evidently with advice from E. R. Dunn.)
4. 1937 or 1940. Suggestions to collectors of rep-

tiles and amphibians. American Museum of Natural History, 7 octavo pages. (Revision by G. K. Noble and C. M. Bogert.)

5. 1942–1959. (Same title as above.) American Museum of Natural History, 8 octavo pages. (Similar to no. 4 above; probably edited by C. M. Bogert. Distinguished from no. 4 by having the Museum seal on the cover instead of the 77th Street façade, in lacking "G.K.N." after the preface, and in name of Department [Amphibians and Reptiles instead of Herpetology]; change in pagination caused by slightly different typeset.)
6. 1963. Supplement to the pamphlet "Suggestions to collectors of reptiles and amphibians." 1 sheet (2 octavo pages, unnumbered), intended to be distributed with no. 5 above. (Prepared by R. G. Zweifel.)

In addition to leaflets 1–6 above, there also is a surviving copy of a small (5¼ × 8¼-inch trimmed size), undated 1-page leaflet labeled "Directions for Shipping," which includes a brief paragraph on collecting. I have no definite idea where these directions fit into the above scheme, although wording and typography suggest that they may be roughly contemporaneous with the salamander leaflet. Furthermore, I have no confidence that I have seen all versions of the printed AMNH collecting leaflets. Although I have indicated best guesses as to authorship, all except Noble's salamander leaflet comprise a series of revisions of the same material, with additions, by curators Noble, Schmidt, Bogert, and Zweifel. Authorship can just as well be attributed to "Department of Herpetology," which basically is what they intended.

The initial leaflet was prepared by someone with field experience in the tropics, as indicated by suggestions advocating use of pit traps at permanent camps, native collectors, strong rum or "pure Aguardiente" (in lieu of formalin), and the "5 gal. square kerosene cans of the Standard Oil Company . . . in the original wooded boxes containing 2 cans each." The successive leaflets built on one another, with additional knowledge on collecting and preservation. Thus, the revised second leaflet recommended night collecting (e.g., for geckos and anurans) by use of an "electric flash light, carbide or kerosene bicycle lamp." Noble's leaflet on salamanders recommended night collecting with an electric hand lamp and suggested the use of wolf or mink baits



AMERICAN MUSEUM OF NATURAL HISTORY

DEPARTMENT OF HERPETOLOGY

SUGGESTIONS TO COLLECTORS OF REPTILES AND AMPHIBIANS

I. COLLECTING.

Collecting falls roughly into two classes:

(a) Personal collecting, (b) collecting by natives.

(a) For most lizards and many snakes the most effective collecting instrument is a .22 cal. pistol shooting shot cartridges, combining the minimum of injury to specimens with the maximum of effectiveness.

Bags of some sort are a necessity in the field. Sugar sacks, salt sacks, and flour sacks will serve, but usually it is possible to have special bags made of strong cloth.

At a permanent camp, traps should be tried, consisting of pits with vertical sides about 2 feet across and 2 feet deep.

The most interesting and valuable specimens are those secured by turning over loose logs, stones, and debris. Many burrowing forms come to the surface under stones, etc., and are secured in this way. It is best to make this type of collecting systematic, following up a stream bed and turning all loose stones, following the border of a forest turning over all fallen logs, or turning over everything loose on a promising hillside. These are unquestionably the places most fruitful of valuable results, and where possible the collector should both literally and figuratively *leave no stone unturned*.

Water forms are caught by seining, with trap nets, by shooting, or with hook and line, etc. Many are best captured when they come ashore.

(b) When really thorough collecting in a new country is engaged in, where time is limited, the collecting must be done by natives, and preferably by boys of 10 to 16 years of age.

If the collector can get a "gang" of youngsters, supply each with a collecting bag, and by an exhibition of enthusiasm and interest, stimulate them to turn over all the rubbish on a hillside, dig in likely places under overturned logs, tear apart all piles of debris, pull apart rotten logs, and tear all loose bark from trees and logs, quantitative results can be counted on. In order to maintain interest it is imperative to reward the collectors for all specimens, usually at a standard price of a cent apiece, lowering the rate for especially common forms, and offering a bonus for the rarer and especially desirable kinds. In this way a whole village may be enlisted in the cause, and specimens will be brought in from all directions.

II. PRESERVING.

(a) Materials.

1. Formalin or Alcohol.
2. Cloth for wrapping specimens.
3. Tough white paper labels.
4. Soft pencil.
5. Tin or glass container.

(b) Killing: The bags containing specimens may be immersed in water, or in water to which a little formalin has been added, the latter method being quicker.

(c) Commercial (40%) Formalin should be diluted with 12 parts of water to one of Formalin. 70% alcohol, pure Aguardiente, strong rum, or wood alcohol may be used instead of Formalin.

(d) A small slit must be made in the abdomen, well to one side, in all except the smallest specimens (under four inches total length), to allow the preservative to enter the body cavity. Larger snakes should have three incisions along the abdomen. A knife can be used for this purpose, a pair of small scissors is better, and if a hypodermic syringe of 50 or 100 cc. capacity is available, injection with the preserving fluid is preferable to cutting the body wall. If the hypodermic is used, the body must not be unduly distended, and snakes must be injected at three or four places. Very large specimens (over one foot in length of body) must be injected in the base of the tail and the fleshy parts of the limbs. Very large snakes should be skinned out leaving head and tail in the skin, which should be placed in alcohol, *not* dried.

(e) Specimens should be sorted as to size, and salamanders and frogs separated from the scaled reptiles. The resulting lots of specimens for a single day, from a single locality, should each have a good sized label, the date and locality written on it with soft pencil. Each lot, with the label inside, must be firmly wrapped in cloth (cheesecloth is excellent) and tied securely; the wrapping and tying must be firm enough to prevent rubbing of specimens against each other, and rubbing of the label. When special information applies to a single specimen, a separate tag may be tied to it.

(f) The resulting packages are placed in the container and covered with the preservative. Caution is necessary if alcohol is used; if too strong it will certainly ruin amphibians; for these it should not exceed 60% (ordinary rum).

(g) For shipping or transportation, after the specimens have been in preservative for two weeks, the packages should be removed from the liquid, packed snugly in a can, thoroughly moistened with preservative, and the excess liquid poured off. The cans should then be sealed with solder, for which a native tinsmith is usually available. For shipping small lots of specimens, air tight friction top tins are ideal, and do not require solder. For larger quantities the 5 gal. square kerosene cans of the Standard Oil Company are excellent, especially as they can be shipped in the original wooden boxes containing 2 cans each. (These should invariably be soldered).

(h) All sealed packages should be sent through the Custom House *in bond* to the American Museum of Natural History, Dept. of Herpetology, New York City.

Fig. 43. The first known Department of Herpetology collecting leaflet, a single quarto page thought to have been printed in 1919. AMNH Dept. Herpetology Archives.

for aquatic species. Bogert seems to have contributed the technique of highway collecting (likely learned from his mentor Laurence Klauber), and Zweifel's supplement provided improvements in preservation techniques and

more modern and humane methods of killing amphibians (with chlorobutanol) and reptiles (with veterinary nembutal).

Schmidt went on to establish a Division of Reptiles and Amphibians at the Field Mu-

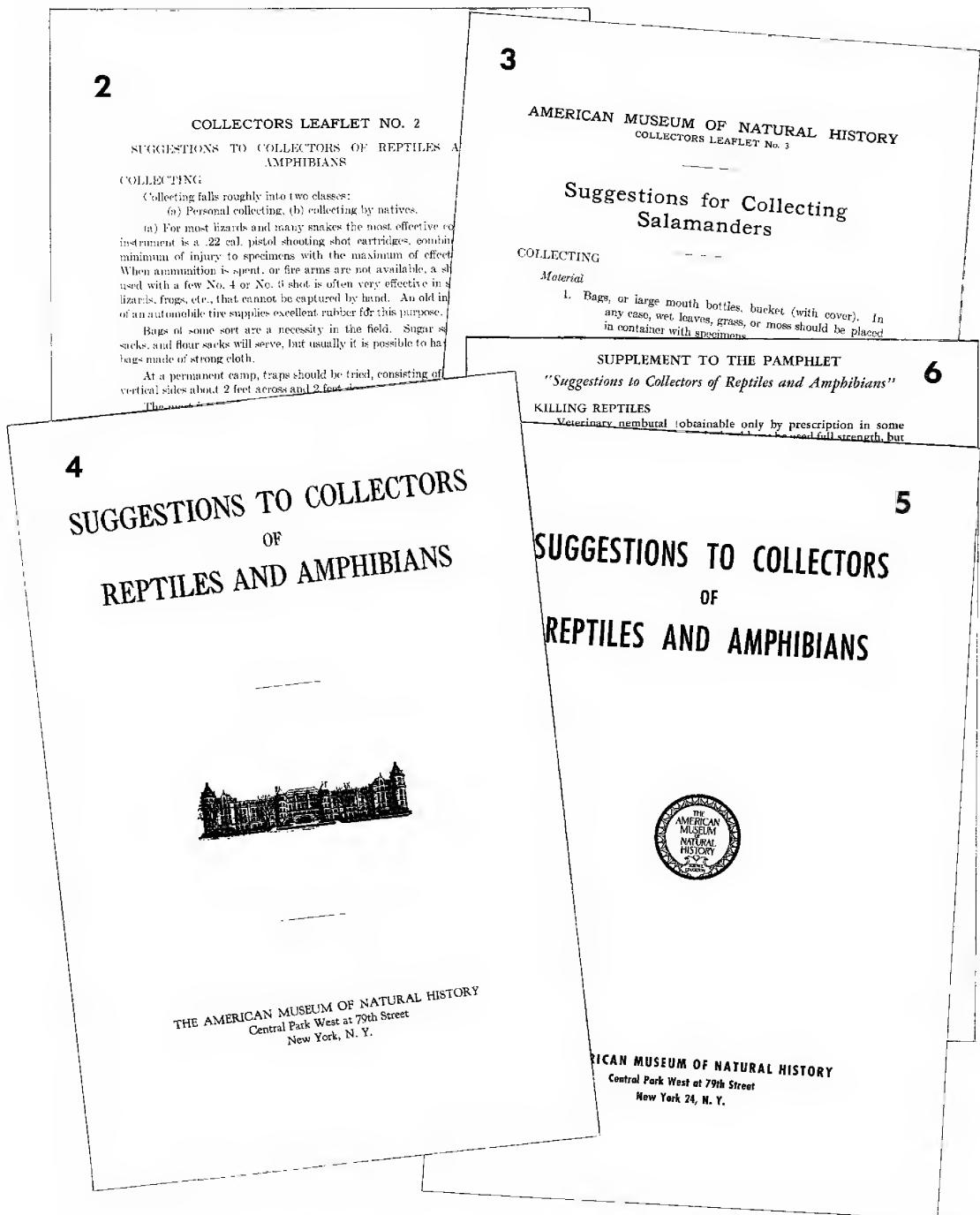


Fig. 44. Subsequent collecting pamphlets (numbered as in text), 1922–1963. These are octavo size, with 2–8 printed pages. AMNH Dept. Herpetology Archives.

seum and, not surprisingly, produced a nearly identical *Suggestions to Collectors of Reptiles and Amphibians* for that Museum (aside from shifting about paragraphs and some ad-

ditions on packing and mailing, the Field Museum pamphlet is essentially the same as AMNH leaflet no. 2 above).

Ford and Simmons (1997: 578) mentioned

an American Museum leaflet and one from the Field Museum as their only explicitly cited examples of Museum leaflets “remarkably similar in advice and style [that] appear to have Leonhard Hess Stejneger (1851–1943; 1891) as a root source.” Ford and Simmons claimed that “All are very similar, and in a few instances entire sentences in these anonymous pamphlets are taken verbatim from Stejneger’s paper [which], however, was more complete.” This statement is in error.

I compared the AMNH leaflets cited above and the FMNH one with Stejneger (1891a, 1891b) and could find no identical sentences or any similarity in style with Stejneger. It is the Field Museum pamphlet that is very similar (i.e., nearly identical) with one of the American Museum leaflets. The paper by Stejneger (1891a) and a similar, clearly derivative one by Ruthven (1912a) doubtless are more complete than the later-published American Museum leaflets, but the former documents are rather stiffly written and formal, and they seem (regardless of introductory statements) to have been aimed mainly at someone going on well-outfitted trips. Stejneger and Ruthven assumed that the collector would have all kinds of stuff. For example, Stejneger included copper alcohol tanks, placental forceps, and Ridgeway’s color dictionary among his suggested materials, and Ruthven added a bone saw, arsenic, and such to the list.

The early American Museum Herpetology staff knew and had read and used the Stejneger and Ruthven papers. Dickerson petitioned Ruthven for “several copies of your pamphlet . . . for Museum purposes” in 1915,¹⁸⁶ and her assistant Arline Field made passing reference to “Stejneger’s pamphlet” in 1916.¹⁸⁷ But collecting advice in the National Museum and the Michigan papers was judged inadequate by 1919, and, in any case, those pamphlets were neither available in quantity nor otherwise desirable for American Museum (or Field Museum) purposes.

Stejneger and Ruthven’s advice must have seemed deficient to Noble and Schmidt in not reflecting the all-important tropical experience, which they had recently gained and which also had been acquired through other American Museum expeditions (especially the 1909–1915 Lang-Chapin Congo Expe-

dition and the Department’s 1916–1917 Nicaraguan Expedition). The new realization that tropical collecting was somehow different was expressed by Schmidt when giving advice to William Beebe, who was trying to collect at the Tropical Research Station in British Guiana (emphasis added):

We were much interested in your comments on collecting in your recent letter to Miss Dickerson, and glad to have word from the Station, even if it is not very encouraging so far as the Amphibians go.

Presumably snakes are equally as rare as amphibians; lizards should be [a] little more common, especially if looked [for] in their hiding places under logs and chunks and loose bark. It is a real calamity that the Influenza has decimated the collecting population. *We have recently drawn up a sheet of suggestions for collectors (of which I am sending Alfred [Emerson] copies) most of which hinge on the availability of native collectors.* Where individuals are scarce, as appears to be the case with most tropical Reptiles and Amphibians it is impossible to gather an adequate representation of the fauna except through a large number of natives. I am in hopes that a new generation of Indian collectors may be developing under your direction during the present season. *Perhaps one of the chief secrets of Mr. Lang’s success in securing so huge a collection from the Congo Forest was the abundant native help of which he made the fullest use.*¹⁸⁸

In addition to more explicitly addressing the tropical aspect, the American Museum leaflets differed from those of Stejneger and Ruthven in several respects. First, they suggested only the most basic of supplies, encouraged improvisation (pure *Aguardiente* [hard liquor] would do for preserving¹⁸⁹), and more explicitly told how to send specimens from foreign countries (“through the Custom House *in bond*”). Second, they are certainly more concise, being less verbose and lighter in style. Last and more importantly, they offered better or more up-to-date collecting advice (except, curiously, the first three AMNH leaflets omitted the classic technique of noosing, mentioned by both Stejneger and Ruthven).

It is noteworthy that the American Museum leaflets early came to recognize what is now regarded as the *essential* tactic of night collecting, which was barely alluded to by Stejneger and was not mentioned at all in Ruthven’s paper (see The “New Technique” of Night Collecting, under Some Early Department Fieldwork).

Although much of the original 1919 text would remain unchanged, the American Museum leaflets were occasionally updated with

new techniques. They were not journal articles of "instructions," but were disposable, informal "suggestions." They were intended for even the most casual traveler who might be persuaded to obtain a few (or many) specimens for the American Museum. In that sense they were propaganda for the Department of Herpetology and served their purpose well. Other institutions used them too, but not necessarily with the Department's blessing.¹⁹⁰

COLLECTION GROWTH AND DIVERSITY

GROWTH: By 1888, the Museum's herpetological study collections (as opposed to the exhibition collections) comprised only an estimated 1100 specimens, excluding skeletons.¹⁹¹ A more detailed inventory of accumulated fishes, amphibians, and reptiles was a priority of the new Department of Ichthyology and Herpetology, with results announced in the first departmental report (Dean, 1910). The herpetological collections that had accumulated at the Museum from 1870 to 1909 amounted only to some 6000 specimens of 700 species—150 species of amphibians, 550 species of reptiles. Thereafter, Dickerson (and Noble after her) encouraged rapid growth of the collection for study and exhibition purposes.

Annual summaries of collection size were not routinely given until the annual report for fiscal year 1968–1969, but an idea of growth is gained from the following tallies taken from occasional reports:

YEAR	REPTILES	AMPHIBIANS	TOTAL
1909	4,500	1,775	6,275
1920	18,108	13,400	31,508
1921	21,200	14,550	35,750
1928	—	—	>70,000
1937	—	—	105,900
1970	104,417	83,614	188,031
1982	125,527	116,795	265,536 ^a
1997	143,233	155,155	307,010 ^b

^a Total includes 23,214 specimens catalogued but untagged.

^b Includes 8622 specimens catalogued but still untagged.

The rate of collection growth is somewhat obscured by the former practice of assigning only one or two tags to series of catalogued

specimens, usually amphibians. A catalogue census in November 1982 revealed that there were nearly twice as many untagged amphibians as untagged reptiles; counting all catalogued specimens, tagged and untagged, there were only about 2400 more reptiles than amphibians in 1982, and the amphibians came to predominate within a few years. Only about 8600 catalogued specimens (mostly amphibians) remained untagged by 1997.

That reptiles outnumbered amphibians in the collection for many years is explained by the fact that many early specimens were obtained by expedition members who also collected mammals, birds, etc. and who worked mainly by day. The balance finally shifted some years after professional herpetologists had started working extensively day and night, especially in the wet tropics (see The "New Technique" of Night Collecting).

TAXONOMIC COVERAGE: Representation of the world herpetofauna is very broad and includes all families. More than half of the estimated 12,000 living species are represented. The following computer-generated census was made in September 1998:

ORDER OR SUBORDER	FAMILIES	GENERA	SPECIES
Gymnophiona	6	26	60
Caudata	10	50	244
Anura	25	286	2166
Testudines	12	76	221
Crocodylia	3	8	26
Rhynchocephalia	1	1	1
Amphisbaenia	4	21	76
Sauria	18	335	2151
Serpentes	14	360	1737
Total Amphibia	41	362	2470
Total Reptilia	52	801	4212
Grand Total	93	1163	6682

GEOGRAPHIC REPRESENTATION: The scope of the herpetological collections is truly global, with especially good representation for the United States, Mexico and Central America, the West Indies, South America, Australia, New Guinea, the Pacific Islands, China, Pakistan, and Africa.

It is startling to realize that the global basis of the collections was established in little more than a decade. This was graphically demonstrated by map data from Noble in the

1923 annual report (here reproduced as fig. 45). Not only had a series of major expeditions to far-flung regions been delivering their treasures (see below), but Dickerson had very actively worked to increase the taxonomic and geographic diversity of the collection by every means possible.

Dickerson had a winning way with her solicitations, as revealed in the following letter to a source in China, written on November 8, 1920, only 11 days before she was forcibly removed from the Museum and from her "life's work":

. . . I am especially glad the [American Museum] Journals reached you all right and that they hold something of American and American Museum science that interests you. Because of our great desire to fill the numerous gaps in reptile and amphibian species on our shelves, your letter brings encouragement. The salamanders will prove of especial interest. You must have put in strenuous work getting them. As to the numerous [fish] specimens for Mr. [John Treadwell] Nichols' department, of course, scientific "greed" would make me wish that some magic in the preserving fluid would convert them all into salamanders on the way here. It is fine, however, to know that you have the herpetology department particularly in mind and that some substantial shipments will perhaps come in the future.

What can the American Museum send from New York to serve your needs?¹⁹²

Noble continued the tradition of global procurement, as did Bogert and Zweifel. Zweifel demonstrated in his archival report for 1968–1969 that the trend toward strengthening the global nature of the collections had continued apparently unabated (fig. 45).

ORPHAN AND OTHER COLLECTIONS: Over

time, the size and diversity of the Museum's herpetological collections have been significantly augmented by acquisition of preexisting collections acquired by gift, purchase, or trade. Indeed, the Museum's collection was founded on that of Maximilian, Prince of Wied-Neuwied, the most significant 19th-century purchase of amphibians and reptiles made by the Museum.¹⁹³ Other important materials obtained by purchase or trade include the Edward Drinker Cope specimens (see Myers, 1982b: 23) from Costa Rica and Colombia, as well as early Colombian specimens from Hermano Nicéforo María.

Of particular importance, however, are those collections that were built up over time by other individuals or other institutions and then *donated* to the Museum in order to ensure perpetuity of care and use. These include:

Brooklyn Museum Collection
 Richard Etheridge Skeletal Collection
 Ernest Liner Collection (with special emphasis on northeastern Mexico)
 Sherman Minton Collection
 Newark Museum Collection (consisting mainly of New Jersey amphibians and Kenneth Gosner's amphibian developmental series)
 James Organ Collection
 Rutgers (Newark) University Collection (assembled mainly by former Research Associate James Anderson and students)
 Toledo Zoological Society Collection (Conant's Ohio Collection; see Conant, 1951)
 Virginia Polytechnic Institute Collection

These collections greatly enrich the holdings accumulated during a century of Museum expeditions.

EXPEDITION SOURCES OF THE COLLECTION

The zoological and anthropological holdings of the American Museum conjure worldwide memories of hundreds of major expeditions, including some that are appropriately termed the "Great Expeditions," a few of which even lasted the better part of a decade or more. Following are the major expeditions and a partial listing of minor expeditions and other field trips that contributed to growth of the Herpetology collections.

There is great latitude in citing American Museum expeditions by name, and for some there is no established convention, or at least

not a consistent one. The First, Second, and Third Asiatic Expeditions, for example, were later grouped as the "Central Asiatic Expeditions." I have tended to use, where appropriate, formal names as published in paper titles. Parenthetical AMNH numbers are references to listings in the Museum Library's very incomplete *Expedition File* (see Archival Sources and Acknowledgments); I often have adopted more descriptive expedition names than found therein.

The collections resulting from these expeditions were gathered mostly under American Museum sponsorship of one form or an-

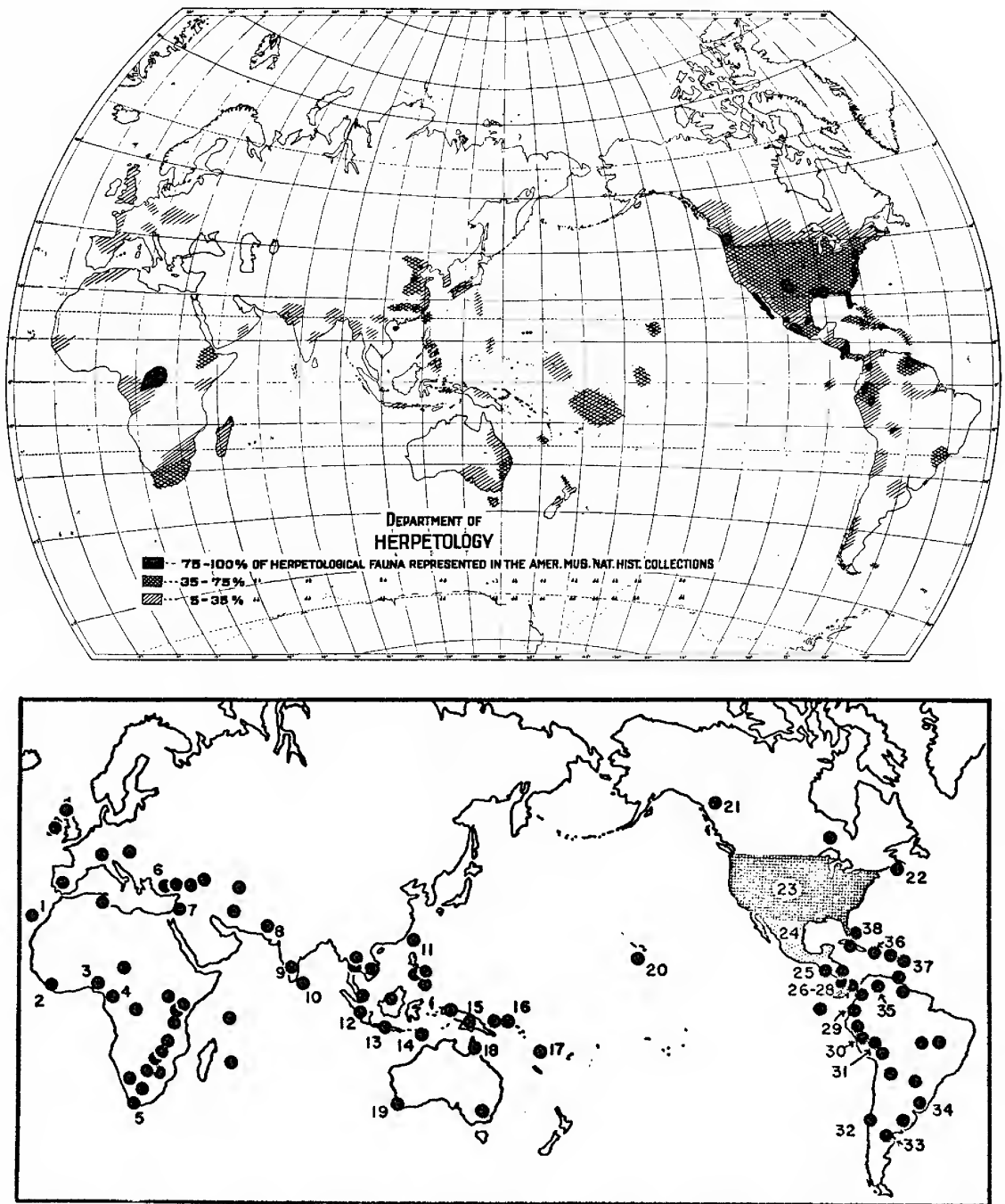


Fig. 45. Global coverage for the herpetology holdings as depicted in annual reports. **Top:** G. K. Noble's estimation of holdings in the Museum's published report for 1923. **Bottom:** Origin of herpetological specimens accessioned during 1963-1969, prepared by R. G. Zweifel for the Department of Herpetology archival report for 1968-1969 (numbered localities corresponded to a list of accessions for that fiscal year alone).

other, usually by persons directly associated with the Museum, including curators in several departments, research associates, trustees, departmental assistants and other expeditionary personnel, and volunteers. There are some instances where the Department of Herpetology sponsored the work of non-Museum personnel either by arranging payment for them to go into the field or else to collect while engaged in other pursuits; examples include Robert D. Camp in Arizona (1919), Paul R  thling (1919–1920) in Mexico, and Borys Malkin in South America (1957–1991).

A few important collections included in the following list were derived from nonstaff colleagues who used the AMNH as a repository for the fruits of their own expeditions. The best example is William Beebe of the New York Zoological Society, whose collections range over half a century (1910–1959), mostly in the Western Hemisphere but with a few specimens from ports of call in the Eastern Hemisphere. The largest collections made by Beebe and his associates were from his old tropical research station in British Guiana (>1100 specimens, 1913–1942), from Rancho Grande and other sites in Venezuela (700 specimens, 1922–1948), and from the biological station in Trinidad (>150 specimens, 1916–1957).

Following, then, is a sampling of fieldwork that is relevant to the growth of the amphibian and reptile collections. I believe that all (or at least nearly all) major expeditions and field trips are listed, but the account is *not* exhaustive.¹⁹⁴ I have tried to cite one or more key publications as a guide to the importance of the materials, but this largely reflects my own memory of the literature and is therefore an imperfect attempt at best. Also, note that collections from many important expeditions (e.g., Harvey Bassler's) have never been addressed as units, although use of the specimens in revisionary studies is pervasive. Expeditions preceded by an asterisk (*) are discussed later in An Overview of American Museum Expeditionary History.

1890–1898. Lumholtz Expeditions to the Sierra Madre (AMNH 002). References: Lumholtz (1891a, 1891b, 1902).

- 1891–1894. Chapman's Expeditions to Florida, Cuba, and Trinidad (AMNH 003, 008, 013).
 1903–1906. Batty Expedition to Mexico (AMNH 042).
 1906. Ruthven-von Krockow Arizona–New Mexico Expedition (AMNH 047). Reference: Ruthven (1907).
 1909. Andrews Philippine Expedition (AMNH 071).
 *1909–1915. Lang–Chapin Congo Expedition (AMNH 079). References: Osborn (1919 [map and list of localities]), Schmidt (1919a, 1923), and Noble (1924a). See discussion under Some Multidisciplinary Expeditions.
 1910–1959. William Beebe–New York Zoological Society collections from British Guiana, Venezuela, Trinidad, etc. (mostly Western Hemisphere). References: Beebe (1919, 1945, 1946, 1952), Beebe and Crane (1947), and Noble (1923k, 1925b).
 1911. *Albatross* Expedition to the Gulf of California, under the auspices of the U.S. Bureau of Fisheries and the American Museum of Natural History (no AMNH number assignment; funded mainly by A. C. James, AMNH Trustee, and accompanied by H. E. Anthony, AMNH collector [later Curator in Mammalogy]). References: Townsend (1916), Dickerson (1919a), and Schmidt (1922a).
 1911–1945. Murphy's collections from the Pacific littoral of Panama, Colombia, Ecuador, and Peru (in part, AMNH 188, 363, 421).
 *1912. Dickerson Arizona Desert Expedition (no AMNH number assignment¹⁹⁵). See discussion under Some Early Department Fieldwork.
 1912–1940. Noble's collections from eastern U.S.
 *1913–1914. Roosevelt South American Expedition of the American Museum of Natural History [including the Roosevelt–Rondon Brazil Expedition] (AMNH 109). References: Miller (1915) and Roosevelt (1914, 1915). See discussion under Some Multidisciplinary Expeditions.
 *1915. Halter's Santo Domingo Expedition (AMNH 119). Reference: Schmidt (1921d). See discussion under Some Early Department Fieldwork.
 1915–1916. Miller [“Miller–Roosevelt”] South American Expedition (AMNH 114).
 *1916. Dunn's North Carolina Expedition (AMNH 124). Reference: Dunn (1917). See discussion under Some Early Department Fieldwork.
 *1916–1917. Halter–Mannhardt Nicaraguan Expedition (AMNH 123). Reference: Noble (1918a). See discussion under Some Early Department Fieldwork.

- *1916–1931. Central Asiatic Expeditions (AMNH 126, 145, 163). References: Andrews (1932), Pope (1924–1935), Pope and Boring (1940), and Schmidt (1927b, 1927c, 1927d). See discussion under Some Multidisciplinary Expeditions (Andrews and Pope in China), as well as remarks under Her “Triumvirate” (i.e., the Karl Patterson Schmidt section).
- *1919. Scientific survey of Puerto Rico and the Virgin Islands, sponsored by N.Y. Acad. Sci. in cooperation with the Government of Puerto Rico and the American Museum of Natural History (AMNH 131). References: Schmidt (1920d, 1927a, 1928). See discussion under Some Early Department Fieldwork.
1919. Robert Camp’s SE Arizona Expedition (AMNH 137).
1919. Barnum Brown’s Cuban Expedition (AMNH 138).
- 1919–1920. R  thling Mexican Expedition (AMNH 147). References: Dunn (1928a), and Kellogg (1932: 10 [regarding R  thling’s itinerary]).
1920. Barnum Brown’s Expedition to Abyssinia and Somaliland (no AMNH number assignment). Reference: Noble (1922d).
- 1920–1921. Crampton South Seas Expedition (AMNH 153).
- 1920–1924. Anthony–Tate Expeditions to Ecuador (AMNH 155, 170). References: Cadle (1998), and Noble (1921h).
- *1920–1941. Whitney South Sea Expedition (AMNH 156, 242, 279, 416). References: Murphy (1922, 1924), Schmidt (1921e, 1922c), Schmidt and Burt (1930), Burt (1930), and Burt and Burt (1932). See discussion under Some Multidisciplinary Expeditions.
- 1921–1923. Gregory–Raven Expeditions to Australia (AMNH 160).
- 1921–1925. Barnum Brown’s Expeditions to India, Burma, Greece (AMNH 161).
- *1921–1931. The Harvey Bassler Expeditions in the Upper Amazon (no AMNH number assignment). References: Dunn (1949a, 1949b), Myers (1982a), and Oliver (1947a). See Bassler in the Upper Amazon, under Some Early Department Fieldwork.
- *1922. Angelo Heilprin Expedition to the Dominican Republic (AMNH 168). References: Noble (1923a, 1923d, 1923e, 1923f, 1923o). See The Department Infiltrates Hispaniola, under Some Early Department Fieldwork.
- 1922–1923. Lang–La Varre British Guiana Expedition (AMNH 171).
- 1922–1923. Faunthorpe–Vernay Expedition to India, Burma, Siam, Assam, Nepal (AMNH 172).
1923. Ortenburger Gila Monster Expedition (AMNH 178). References: A. I. Ortenburger (1924b), R. D. Ortenburger (1924), and Ortenburger and Ortenburger (1924).
- 1923–1935. Olalla Ecuador Expeditions (AMNH 195 for part).
- *1924. Marsh–Dari  n Expedition (AMNH 183). References: Breder (1925, 1946 and citations therein), and Dunn (1934). See Breder in Dari  n Jungles, under Some Early Department Fieldwork.
1924. Griscom–Benson Expedition to western Panama (AMNH 184). References: Griscom (1924 [itinerary]), Myers (1969: 32 [comment on]), and Myers and Duellman (1982: fig. 1 caption [regarding localities]).
- 1924–1936. Hassler’s collections from eastern U.S.
1925. Tate Expedition to Mt. Turumiquire, NE Venezuela (AMNH 190). Reference: Horton (1973).
1925. Vernay Angola Expedition (AMNH 191). Reference: Bogert (1940).
- *1926. Burden Dutch East Indies Expedition (AMNH 197). References: Burden (1927a, 1927b, 1928, 1960), and Dunn (1927a, 1927b, 1927c, 1928b). See Burden, on the Trail of Dragons, under Some Early Department Fieldwork.
1926. Ladew–Tate Expedition to Bolivia and Peru (AMNH 199). Reference: Tate (1933).
1926. Anthony–Goodwin West Indies Expedition (AMNH 206).
- 1926–1927. Chapin–Sage Ruwenzori–Kivu African Expedition (AMNH 212). Reference: Bogert (1940).
- 1926–1927. Taylor Sudan Expedition (AMNH 213).
- 1926–1929. Vernay–Faunthorpe East Indies Expedition (AMNH 214).
1927. Pope’s North Carolina Expedition (AMNH 221). Reference: Pope (1928a).
- *1927–1928. The Lee Garnett Day Roraima Expedition of the American Museum of Natural History (AMNH 228). References: Tate (1928, 1930). See Lost Worlds, under Some Multidisciplinary Expeditions.
1928. Carlisle–Clark African Expedition (AMNH 229).
1928. Noble–Marshall Ozark Expedition (AMNH 230). References: Noble (1927h, 1928c, 1929a, 1929h).
1928. Marshall Texas Cave Expedition (no AMNH number assignment). Reference: Noble (1929l).

1928. Noble's Woods Hole collection (AMNH 232).
1928. Sanford-Legendre Abyssinian Expedition (AMNH 233).
1928. Weber Panama Expedition (AMNH 237).
- *1928-1929. The Sidney F. Tyler, Jr. Duida Expedition of the American Museum of Natural History (AMNH 238). References: Tate and Hitchcock (1930), Rivero (1968), Lynch (1979), and Myers and Donnelly (1996). See *Lost Worlds*, under *Some Multidisciplinary Expeditions*.
- 1928-1930. Rockefeller-Murphy Tanganyika Expedition (AMNH 241). Reference: Bogert (1940).
1929. De Sola Cuban Expedition (AMNH 247).
1929. Heilprin Yucatán Expedition (AMNH 248).
- *1929. Klingel Haiti Expedition (AMNH 249). Reference: Klingel (1929).
1929. Straus Central African Expedition (AMNH 250). Reference: Bogert (1940).
1929. Heilprin Florida Expedition (AMNH 252). Reference: Noble (1930l).
1929. Correia's Gulf of Guinea Expedition (AMNH 268).
1929. Burt and Burt Mississippi Valley collection (no AMNH number assignment). Reference: Burt and Burt (1929a).
- 1929-1930. Morden-Graves Asiatic (Turkestan) Expedition (AMNH 255).
- 1929-1931. Archbold Madagascar Expedition [the American Museum part of the Mission Zoologique Franco-Anglo-Américaine à Madagascar] (AMNH 254). Reference: Rand (1936 [itinerary]).
- 1929-1931. Chapin-Edson Congo Expedition (AMNH 274). Reference: Bogert (1940).
- 1929-1931. Columbia University-American Museum Anatomical Expedition to Belgian Congo and French West Africa (AMNH 260). Reference: Bogert (1940).
1930. Astor-Galápagos Expedition (AMNH 267).
- *1930. Heilprin Santo Domingo Expedition (AMNH 253). Reference: Hassler (1930). See *The Department Infiltrates Hispaniola*, under *Some Early Department Fieldwork*.
1930. Noble's West Virginia Expedition (AMNH 270). Reference: Noble and Evans (1932c in appendix 3).
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AN OVERVIEW OF AMERICAN MUSEUM EXPEDITIONARY HISTORY RELEVANT TO HERPETOLOGY

A plane ride and automobile rental are now the basis for many a successful *field trip* into regions once penetrated only by elaborate planning and difficult travel, and so the word "expedition" has little currency nowadays. I reserve its modern use for serious back-country work involving the necessary establishment of camps in roadless or very remote regions, whether travel is on foot or by dugout, horseback, jeep, or helicopter. This is not to be equated with "camping," but rather with providing the means by which one or more scientists can accomplish specific objectives with minimal distraction for weeks or months at a stretch. As in years past, such trips still involve detailed planning and basically the same logistic problems of moving supplies, equipment, and personnel; for example, even when it is possible to have the convenience of four-wheel drive trucks or helicopters, moving large quantities of fuel to an advance, secure position in Mongolia or to some roadless spot in South

America can be a formidable problem. Courage has proven its worth at times, but it mainly is a combination of financing, logistics, and hard work by competent people that have always made the successful expedition.

In the first 30 years of its existence, during the late 1800s, the collections of Recent vertebrates at the American Museum grew primarily by purchase of preexisting collections in Europe and North America. But a kind of expeditionary fever was to develop at the American Museum of Natural History, starting slowly in the 1890s and peaking in the early decades of the 20th century. The first of several elements that led to the success of hundreds of expeditions was, to put it simply, money. Kennedy (1968: ii) succinctly summarized the point:

The American Museum of Natural History was founded . . . by a group of wealthy New York business men who believed that a natural history museum would give the city prestige, and educate the public in the lessons of nature. The trustees supported their

new museum generously, buying hundreds of thousands of specimens for it. In [1887] the trustees also began to send out collecting expeditions, and by 1910 the size and value of the Museum's collections ranked it among the great natural history museums of the world.

The first expedition was to Montana to collect bison. Soon thereafter, however, not even the Arctic and Antarctic were outside the Museum's sphere of interest. Polar explorers, including Peary, Stefánsson, Mac-Millan, Ellsworth, and Byrd, were to come to the Museum for various reasons, usually regarding possible financial support or commitments to bring back specimens. And an American hero, Major General Adolphus W. Greely, Commander (and one of six survivors) of the tragic Lady Franklin Bay Expedition (1881–1884), wrote about current polar exploration for *The American Museum Journal*, which was being edited by Herpetology's Mary Dickerson. Vilhjálmur Stefánsson in particular found a temporary home at the Museum and attracted the friendship of Carl Akeley (Bodry-Sanders, 1991: 157) and Roy Chapman Andrews. Stefánsson's long disappearance may have contributed in some way to Dickerson's delusions (see under Miss Dickerson's Tragedy). What was Dickerson thinking about her colleague in early 1915, when she wrote the following subtitle to an article by McConnell (1915)?

A brief history of Stefánsson's movements from September 20, 1913 . . . until April 7, 1914, when he was last seen on drifting ice, over 180 fathoms of sea at the edge of the continental shelf in the Arctic Ocean.

The age of exploration had not ended, and even American involvement in the First World War would barely slow the Museum's activities. Good people were attracted, and success fed on itself, as revealed by the increasing number of expeditions by decade (expeditions overlapping decades were assigned by the starting year):

1887:	1
1890–1899:	31
1900–1909:	46
1910–1919:	71
1920–1929:	114
1930–1939:	141
1940–1949:	50

The vast majority of expeditions had little relevance to Herpetology except in the broad sense of institutional well-being. Those particularly significant to growth and global coverage of the amphibian and reptile collections are listed on previous pages, along with selected references to expedition reports or other pertinent papers. The following discussion concerns a subset of the previously listed expeditions, selected to provide further insight into the American Museum's expeditionary history and the growth of its herpetological collections. It should be remembered that other departments, especially Anthropology and Vertebrate Paleontology, have very different histories of specimen acquisition, but that some overlap occurred.

SOME EARLY DEPARTMENT
FIELDWORK

With 71 American Museum expeditions in the period 1910–1919, everyone in the Museum must have had expeditions on their minds during the founding years of the Department. Local collecting was needed too, and was probably encouraged by the likes of Dickerson and John Treadwell Nichols. It must have been a contagious atmosphere. Even Stella Clemence (fig. 3) went to Woods Hole and the Elizabeth Islands (Massachusetts) in 1915, bringing back a worthwhile collection of about 250 specimens of 19 species (3 salamanders, 9 anurans, 4 turtles, 3 snakes).¹⁹⁶

Material was soon pouring into the Department from the major, well-financed expeditions, but Dickerson also wished for Herpetology to have its own expeditions and its own collectors. The following accounts treat the most important of the departmental-sponsored fieldwork, through Dickerson's time and well into Noble's era.

DICKERSON TO ARIZONA, 1912

One has only to read through *The Frog Book* (1906) or, especially, *The Pageant of Nature* (1907) to realize that Mary Dickerson must have loved being outdoors. Maud Slye (1923) mentioned that her friend would escape to the New England countryside on weekends with camera and "tramping outfit." Her enjoyment seems to have been sol-

itary, for, as Noble (1923n) said, "she carried on most of her field work alone." Whether she occasionally got away from the Museum for fieldwork on weekends, I do not know. For the most part, however, once in New York, the countryside was left behind, except for brief trips to New England and Florida for exhibition materials and for one trip of greater duration, to Tucson, Arizona, in 1912.

Dickerson's capable assistant, Stella Clemence, sent 300 pounds of supplies to Tucson via Wells Fargo Express in late July 1912, advising Dickerson that

... You may guess that it was rush work getting them together and I am hoping that at least half the things you will want are there ... I have sent as small an amount as I thought you could work with of heavy things such as plaster, alcohol, plastalene, etc. because the express rates to Tucson are so high (\$13.50 per hundred) and the things as they were weighed 300 lbs. It was the camera outfit that weighed so much and I couldn't very well cut out any of that except the plates and I was afraid you couldn't get what you wanted in Tucson. The butterfly net was the smallest and lightest thing with a long handle I could find ...¹⁹⁷

Shortly after returning, Dickerson summarized her trip in a departmental report:

Through the generosity of the Director in the disposition of his director's fund, three hundred dollars was made available for field work in southern Arizona during the summer. Tucson was reached on August 4 and the return was started on September 10. The period between was spent in a close study of desert conditions and vegetation and desert reptiles.

The University of Arizona, one mile from the heart of Tucson, extended hospitality to the expedition, so that the laboratories of the chief of biology (Dr. J. J. Thornber) on the third floor of the science building, were open for its use. These gave every convenience for work, dark room, electric lights for evening study, etc. From here as a center field trips were made extending from a few miles to a hundred miles. Thus it was possible to observe material in its habitat, then take it to the laboratory where it was kept in wire cages for further observation. As a result considerable interesting material and some ideas were obtained for future exhibition work. Some hundred pages of close descriptive material were written on habitat relations, habits, color changes, and so on. A few dozen photographs from life were made and some color studies ... and plaster molds ... and finally a small collection of reptiles was prepared representative of the region, each numbered with a metal tag and accompanied by field notes.

It was sincerely hoped that the region would yield a superb desert group for the reptile series but it was discovered that one fact continually acted against

planning such a group—namely, that the region because of sharply separated drainage conditions is divided into very distinct plant associations which do not overlap. The reptile life follows this division with but few representatives for each association, so that a large group which would bring together the necessary number of species for interest and educational value of a group would have to be made untrue to habitat relations. For instance, the plant associations of the arroyo, the mesa, the mountain slope and the cañon differ radically and each has its small quota of reptile life. The most picturesque habitat in southern Arizona as well as the richest in reptiles is that of the mountain slope which is already pretty well suggested in the desert bird group. Therefore no large Arizona group has been definitely planned. It is hoped that the opportunity may come in the near future to do field work in Mexico or Central America for such a group. This would allow the representation of a more varied reptile fauna and a habitat new to the Museum's exhibits.¹⁹⁸

Her university host, J. J. Thornber, was at the Smithsonian Institution most of that summer but had instructed a secretary to give Dickerson a key to his laboratory. Thornber returned in September, shortly before Dickerson left. She later wrote:

My dear Dr. Thornber:

... My gratitude to you for the courtesies extended is great, as I tried to tell you before I left; my memories of the day spent in the field with you and Mrs. Thornber are very pleasurable and now that I am pretty comfortably cool, my whole impression of my month at Tucson is taking on a pleasant atmosphere. The collection proves a rather valuable one. The live material reached New York in good shape and is already largely in casts ready for group or synoptic cases.¹⁹⁹

It is not entirely clear how Dickerson got to her field sites, since Thornber's assistant also was away, but she evidently was successfully persuasive in arranging transportation by automobile on some of Arizona's early roads. Unfortunately, only a single ledger of journal jottings survive of her fieldnotes.

Dickerson had gone to what was, for her, a new environment with an idea for a Museum desert habitat group. She looked critically at a variety of landscapes before judging her plan as infeasible because it was "untrue to habitat relations." Nonetheless, she acquired exhibition material and her fieldwork benefitted the collections. According to the accession record (no. 16490) and associated summary, she brought back 32 living and 159 preserved specimens, representing 27 taxa of anurans, lizards, snakes, and tur-

ties, including three genera and six species then new to the Museum's collections. In competitive spirit, she also tabulated 11 taxa that she did not get, but which Ruthven (1907) had collected for the American Museum on his southwestern trip, versus the nine taxa in her collection that Ruthven did not personally collect. But all this was only for Herpetology. She also studied arid-adapted trees in order to get ideas and material for exhibition work in Woods and Forestry, and she collected sprays of flowers and fruit, which she sent back to the Museum by railway express for preparation as display specimens.

In the following year (1913), Dickerson wrote to Ruthven that

I hoped to get out for three months of field work this summer but deferred it to another season because of the serious illness of my father and mother in Michigan . . . It is a pleasure to me to hear of your interest and work in herpetology for my heart is very warm to the subject even if personally I have found time and opportunity for relatively little.²⁰⁰

Dickerson's plans for significant fieldwork for herself, however, were not to materialize again. Nearly three years were to pass before she found ways to seriously involve the Department in a series of field programs to be conducted by others.

HALTER TO SANTO DOMINGO, 1915

Assistant Clarence Halter had not been long at the Museum when Dickerson obtained financing for his participation in the Museum's two-man "Santo Domingo Expedition" to the north coast of the Dominican Republic in the summer of 1915. His companion and official leader of the expedition was Frank Edward Watson, an Assistant in the Department of Invertebrate Zoology, who was to collect insects.

Halter obtained 469 specimens of amphibians and reptiles according to Schmidt (1921d), who included the collection in his report on the herpetology of Santo Domingo. Halter's field journal indicates hard work and a keen eye, with notes on habitat and the habits and coloration of living specimens. For Halter, the West Indian experience was a prelude to work with his friend Mannhardt

on the Central American mainland (see below).

DUNN TO NORTH CAROLINA, 1916

Dunn's approach to Mary Dickerson, as a young man (in March 1916) asking if he could possibly have a summer job collecting for her "in the Carolina mountains," is related earlier in this paper (see under Her "Triumvirate" Plus One). Dickerson found money to finance Dunn's work during July and August in Avery and Transylvania counties, North Carolina, during which time about 1000 amphibians and reptiles were obtained, with 85% being salamanders.

Dickerson had been building a collection for half a dozen years, and Dunn's material was a welcome addition. But if Dickerson's "Department" of Herpetology were to be recognized for its science as well as exhibitions, it was time for it to show publications! Although Dunn felt that he could not accept Dickerson's offer of a place at the museum, he agreed to produce a manuscript based on specimens collected, and so she sent the collection and comparative material to him at Smith College. A manuscript was put together, hurriedly it seems, before Dunn was tied up with military service. Dickerson edited the manuscript, had illustrations done in the Museum under her direction, and saw it to galley stage:

[August 3, 1917:] Glad to report galley of salamander paper in hand. Please let me know if I should send it to you at the above address. I am proud of it.

[August 9, 1917:] I hope you will go over your paper carefully, and be sure that everything is in the order in which you want it. Your typewritten copy came to me with the species considerably mixed, not even all of a genus together. I classified them but hastily, you scan them closely . . . are you certain that you wish to make the new *Clemmys* a new species or a subspecies only, a geographic race?²⁰¹

Dickerson (1917e) also added an "Introductory Note" that served as a summary or abstract, although in it she called Dunn's *Clemmys nuchalis* "a high altitude race of *Clemmys muhlenbergi*" (in which synonymy *nuchalis* currently resides). Dunn's paper, published in October 1917, was one of the first scientific contributions from her Department (along with Dickerson, 1916c, 1917d,

and Noble, 1917). Adler (1989: 92–93) observed that

This first serious field experience with salamanders had a lasting influence on Dunn, which culminated in his only book, "The Salamanders of the Family Plethodontidae" (1926, reprinted 1972), to this day one of the most comprehensive and influential treatments of a single family of amphibians or reptiles . . .

Even before Dunn had started collecting in North Carolina in the summer of 1916, Mary Dickerson had already gotten off the Department's first expedition to the Neotropical mainland.

HALTER AND MANNHARDT IN NICARAGUA, 1916–1917

Halter had done well on his trip to Santo Domingo in the summer of 1915 (see above). On his return, there were discussions with Mary Dickerson about the possibilities of further fieldwork, this time with his friend and fellow reptile enthusiast Leonhard Alfred Mannhardt.²⁰² Nicaragua was chosen, and by the winter of 1916, Halter and Mannhardt started inquiries with the steamship lines. But Dickerson still had to obtain financing and, on April 14, 1916, wrote a long proposal to Bashford Dean, in which she justified the choice of "unworked" Nicaragua, laid out a detailed itinerary, predicted possible results, and recommended the members of the expedition. Parts from her introductory and final paragraphs follow:

The American Museum reptile collections are relatively strong in North American material, and the next logical step would seem to be to push collecting and study of distribution and faunal zones into South America through the connecting islands and Isthmus areas of the West Indies, Mexico, and Central America . . .

I would recommend for this expedition work the following two men:—Mr. C. R. Halter, at present part time assistant of the department, and senior in Columbia University, and who has special interest and ability in reptile work; and Mr. Alfred Mannhardt, instructor at Yale University, and also with special interest and ability in the herpetology work. These men are both experienced in field work, in the handling of camera, fire arms, etc.²⁰³

With some understanding that efforts also would be made to collect fish, Bashford Dean made funding available from the Cleveland H. Dodge fund.²⁰⁴

"The boys" (as Dickerson called them)

left New York on the last day of May 1916, on what Dickerson and they had expected to be "four months' absence from New York, three months in the field." However, they had not the experience to realize that travel, formalities, and inevitable *waiting* for one thing or another would likely eat up at least half of their time anywhere on the tropical mainland. On July 23, Halter wrote (from Río Grande, Nicaragua) a long, grim letter to Dickerson, dripping with discouragement:

. . . we have lost too much time in travel and waiting for our freight . . . the boats are exceedingly slow and sailing dates uncertain and changeable at a moment's notice . . . we have been away from New York City for seven weeks and have collected but three out of the seven . . . the time for our leaving will soon have arrived with a good part of our stay on the place devoted or spent in traveling, and part of the time spent in a reptile and batrachian-forsaken country . . . The whole gist of this letter is discouragement, disappointment and a black future ahead of us on this trip.

We are thinking about the possibilities of staying down here four months longer to "make good." . . . it would be a terrible blow at my college work . . . This is not a suggestion, scarcely a thought. I hate to think of it. However, we shall eagerly await a reply to this letter . . . and be guided by your wishes and directions.

Dickerson wished them to continue, but financing was a problem. As she wrote on August 19, any extension would have to come from "funds controlled by the president [Osborn], and he will not return until the first week in September." But she was able to write to Mannhardt's mother on September 7:

Contrary to my expectations but very much to my pleasure the money for the extension of the Nicaraguan expedition was appropriated today. I am therefore cabling the funds to the boys with letters of instruction regarding the continuation of the work. I know this means deprivation for you in that your son will not return as quickly as you hoped, but it most certainly is best for them as well as for the work.

The Department was learning in 1916 that herpetological collecting in the mainland tropics often is not so easy or as predictable as in some temperate regions, contrary to the expectations of such experienced temperate-zone collectors as Raymond L. Ditmars (see below). As this realization dawned, Dickerson tried to reassure Halter and Mannhardt with the following letter written on September 11:

Mr. Beebe was in this morning. He has just returned

from many months in British Guiana and you will be interested to hear that his report of reptiles and amphibians in that part of South America corresponds pretty closely to your blue reports from Nicaragua. He says that he is of the opinion that most sections in the tropics carry a fauna of many species, but as you have found, few specimens. Mr. Ditmars went to South Carolina this spring and came back with I do not know how many tons of snakes, and says that he must go down to British Guiana and do the same for that region, but there can scarcely be any question that Mr. Beebe is correct . . . If one only knew the breeding times of these creatures that would give the opportunity for large collecting.

With perseverance, acquired experience, and new localities, the collecting improved. In order to gain better coverage, Halter and Mannhardt split up in late September and did not see one another again until months later in New York. Dickerson's letter cheered them, however, for Mannhardt wrote on October 22,

Considering what Mr. Beebe has found . . . it would seem that we are doing well and should be optimistic about our work. I am sorry that we have taken such a pessimistic look in the past, and feel it was needless.

Mannhardt worked up the headwaters of the Prinzapolka River, getting into wild country with a group exploring for mahogany, and reached Eden Mine, where he fell ill with malaria and came under care of the Mine physician. He seems to have regretted the loss of collecting time more than the illness, which he first thought had come on from being constantly wet. The traveler and his equipment change across the years, but some things do not: "My shoes are wet and stay so sometimes a week at a stretch. The cartridge belt and clothes are mouldy, and guns etc. rust." Mannhardt returned to Bluefields and thence to the United States in early December.

Halter got into financial and legal trouble when one of his workers accidentally shot another man in the leg, which was a trying although minor interruption in the fieldwork. On separating from Mannhardt, Halter had taken the larger part of their budget, which enabled him to travel up the Río San Juan and across the great Lake to Managua. Halter also seems to have contracted malaria, but he avoided going to the hospital in Managua by taking large doses of quinine. Halter retraced his route back across the isthmus to Bluefields, arriving ill but able to sail for New Orleans during the first week of February 1917.

The Nicaraguan Expedition returned with about 2500 herpetological specimens (and some 1500 fishes), documented by good field books. In her annual report for 1916, Dickerson wrote (doubtless with pride) that "The work will be published in 1917 by the collectors, Messrs. Clarence H. Halter and L. Alfred Mannhardt." But this was not to happen, although Halter, at least, worked on the project while still employed in the Department and tried to draft a manuscript²⁰⁵ on the snakes before leaving (probably for full-time college work) sometime in 1917. He later published a note dispelling the popular notion that poisonous snakes are very abundant in tropical forest (Halter, 1917). Halter appears to have been chagrined at not having been able to finish the manuscript work:

Dear Miss Dickerson:

My time with you is now at an end. I thank you very sincerely for the opportunity to have worked for you, but I regret not having lived up to your expectations of me.

The snake paper is complete except for the introduction. Miss Field is now typewriting some of the parts . . . May I not come down here a couple of afternoons or mornings a week to finish up the turtles & possibly the lizards . . . without a salary? Please? I owe it to you to finish this up. It wouldn't be more than a couple months at the most, with the Xmas vacation included.

But there was no Christmas vacation. Halter entered military service on December 9, 1917, and seemingly did not write again to the Museum until 1919.

The job of working up the Nicaraguan amphibians was assigned by Dickerson to G. K. Noble as one of his first assignments after he started work in July 1917. Published in the following year, Noble's (1918a) report was very well done and made good, if not thorough, use of the collectors' notes and photographs. The itineraries of Halter and Mannhardt were summarized by Noble without allusion to the travails and illnesses suffered by two young men, who were determined to "make good."

SCHMIDT TO PUERTO RICO, 1919

Like Assistant Halter (see above), Assistant Karl P. Schmidt also had collected in Santo Domingo (Dominican Republic). But whereas Halter's second (and last) collecting trip into tropical regions was a trial, Schmidt's second

tropical experience literally was a pleasant honeymoon back to the West Indies.

A biological survey of Puerto Rico (then Porto Rico) was being conducted under the auspices of the New York Academy of Sciences and needed involvement of a herpetologist. As already related (see Karl Patterson Schmidt, under Her "Triumvirate"), Dickerson not only chose Schmidt for the work, but also arranged for his new wife to go along as his assistant.

The Schmidts obtained more than 1200 specimens during their two months in Puerto Rico and on adjacent islands. Schmidt carried along Stejneger's (1904) pioneering report on Puerto Rico, which greatly facilitated field identifications. Schmidt's report on the collection was characteristically prompt, appearing 11 months after completion of the fieldwork (Schmidt, 1920d), and he usefully elaborated on the fauna eight years later (Schmidt, 1928).

Benefiting from Noble's experience with night collecting (see below), Schmidt paid particular attention to collecting calling frogs with "aid of an electric hand-lamp." Schmidt (1927a) assessed the importance of his work eight years later:

The renewed and more intensive study of the Greater Antillean amphibian fauna was, to some extent, initiated by my field work in Porto Rico in 1919, which added six species of *Eleutherodactylus* to the supposedly well-known herpetological fauna of that island. This was followed by the work of Dr. and Mrs. G. K. Noble in the Dominican Republic in 1922, which added five new *Eleutherodactylus* and a new *Hyla* to the Hispaniolan fauna. The recent additions to the Cuban tree-frogs (eight species) and to the Jamaican fauna (six *Eleutherodactylus* and a *Hyla*) by the field work of Dr. Emmett R. Dunn in 1924 and 1925 were, consequently, scarcely surprising, though it may be emphasized that all of these islands were supposed to be well explored herpetologically. *The new crop of novel species was due to the application of a simple technique of collecting by voice at night, using an electric flashlight* [emphasis added].

The last statement deserves further examination.

THE "NEW TECHNIQUE" OF NIGHT COLLECTING

*Now Chil the Kite brings home the night
That Mang the Bat sets free . . .
Oh, hear the call!—Good hunting all*

(Rudyard Kipling)

There is, at least for me, a special tinge of excitement with the arrival of first dusk in any new camp, especially in tropical wet forest. What rare or new prey will be revealed in the penetrating beam of a powerful electric headlight? Nowadays we so take for granted the ease in which we slip into the role of nocturnal predators that we think little about it, except when checking equipment and planning what weight of batteries to pack, or perhaps if a bulb burns out when one is contemplating fresh jaguar tracks or is standing waist-deep in a rushing stream. The marvelous ability to be able to wander through the darkest night while sending a probe of light far ahead or close at hand is a development of the early 20th century.

Ever since the first zoologists took to the field, some of them surely must have been driven by curiosity to carry lanterns of one kind or another into the dark, but it seems not to have been either commonly done or much talked about. There seems to have been no particular tradition of 18th- or 19th-century academicians prowling the swamps with burning torches or swinging lanterns. In any case, one could only see close at hand.

Matters improved when ways were developed to focus a beam of light, as in the oil-burning "bull's-eye" lanterns used by police in 19th-century England. By the 1890s, such oil lamps were being used as "jacklights" by game hunters in North America and probably elsewhere (e.g., see Shiras, 1935, vol. 1: 41 [photo], 435–436). A much brighter light source came with the first use of acetylene as an illuminant in the 1890s (Robins, 1939: 119). Acetylene or "carbide" lights comprise a chamber in which water is added to calcium carbide; the resulting gas is ignited where it escapes through a small aperture in the middle of a reflector. I remember inexpensive carbide headlamps as being widely available in hardware stores at least through the 1950s, when I used them for exploring caves in the Ozarks, and yet I recall preferring electric headlamps when aboveground.

Portable electric lamps were made possible by development of Georges Leclanché's dry cell in 1866 and Thomas Edison's incandescent lamp in 1879. Electric flashlights were first sold to the public about 1898, be-

ing shown that year at the first electric exhibition in New York City; at that time, a flashlight weighed over 6 pounds or 2.7 kg (Friedlander, 1991). In those days, the word "flashlight" also had a different meaning, as reflected in the titles of articles by the celebrated wildlife photographer (and one-time U.S. congressman) George Shiras. Over a long career, Shiras used jacklights fueled or powered by oil, acetylene gas, and electricity, but the even brighter flash of magnesium powder was to him *the* "flashlight" that enabled his nocturnal photography (e.g., see Shiras, 1906, 1935).

It took awhile for the weight and expense of the new kind of flashlights to come down. It seems probable that dry cells in the earliest 1900s were neither sufficiently reliable nor sufficiently inexpensive to be packed in quantity for expedition purposes. Development was rapid, however, and both modern-looking flashlights and elegant acetylene lights were being used for collecting well before the early 1920s, by which time they had become essential to G. K. Noble (figs. 46, 48).

The concept of night collecting as an essential technique seems to have come slowly. In giving directions for collecting, Stejneger (1891a) had noted that "A number of reptiles are more or less nocturnal . . . [and a] fire or lantern may then be used to good advantage." Ruthven (1912a), in a similar paper, had nothing to say about night collecting, although he had done some night work in Mexico in 1910 (Ruthven, 1912b: 311), and neither he nor Stejneger included lamps or lanterns in their lists of essential equipment. Taylor (1975: 16) went out at night in the Philippines in 1912, using a "Coleman lantern, purchased in Manila." But even before that, there was Mary Dickerson. She said little specific about night work in *The Frog Book* (1906), and much of her observation in chilly New England could be made by day:

For some time we watch him as he sings. We try to capture him, and get only a handful of mud for our pains. Silence begins again, and spreads rapidly, till not one frog is peeping. We suddenly feel the dreariness of the place, the wind blows cold and it is getting dark. We retreat with the congratulatory remark, "At any rate, we have seen a peeper!"

She went on to say, however, that

If we go to the marsh at night, they do not seem to see or hear us, and it is not as difficult as might be supposed to locate them by means of their inflated white throats.

One can visualize this Victorian lady sloshing about in the dark while holding long skirts in one hand and—in the other hand, what kind of light? Dickerson clearly picked up the concept of night collecting as something that was good to do, sending the following advice to her assistant Clarence Halter in the Dominican Republic in 1915:

Remember that intensive work in a small suitable area *with work at dusk and at night* [emphasis added] when there are dews, and after or during rain . . . gives best results for the burrowing snakes and lizards and for amphibians, although daytime search under logs and stones will bring some of these specimens to light also.²⁰⁶

In the year following, Halter and his associate Mannhardt used some sort of "bright acetylene lamp" for capturing at least a few specimens (e.g., see Noble, 1918a: 336) on the Department's Nicaraguan Expedition. Before leaving New York they had purchased two lamps and "handles for same" at a total cost of \$6.90, as well as "8 Cans Carbide (2 lb.)" for \$1.60 total.²⁰⁷

Night collecting was coming of age slowly, and Schmidt and Noble were among the few workers who seemed to realize that they were breaking new ground.

G. K. Noble appears to have been the one most conscious of the possibilities and the newness of night work. Noble also may have been the first herpetologist to effectively use lights for night collecting as a *routine* procedure in the New World tropics during the 1916 Harvard-Peruvian Expedition, about which he later wrote (Noble, 1921f):

There is one and only one way of delving into the home life of a frog: that is to steal upon him at night when his amorous calling betrays his place of hiding. With an electric flashlight the task is easy, for the frog seems to be as little concerned over one's presence as he is over the fireflies which flit across his world. His calling, love making, nest building, may be examined in as great detail in the open as is his structure in the laboratory. It was obvious that, if we were to inveigle the marsupial frog into revealing any of his great secrets, it would have to be done at night. (p. 481)

We passed on to the east, to months of hard riding



Fig. 46. The “new technique” of night collecting. **Top:** Ruth Crosby Noble spotting a frog (*Hyla versicolor*) in Queens, Long Island (May 1922). **Bottom:** Ruth Crosby Noble and pal spotting *Hyla andersonii* on fence at Lakehurst, New Jersey (June 1922). The flashlight held by Mrs. Noble in the top photograph is similar to modern ones; her light in the bottom photograph is one of the acetylene (carbide) lamps favored by her husband, G. K. Noble, who was an early, enthusiastic practitioner of night studies. Both kinds of lights were rapidly developed in the early years of the 20th century and were widely available by 1920. AMNH Photographic Archives 244585, 244526.

and pleasant hunting in the *montaña* of the Oriente. There were many evenings of searching with the flashlight, of running down new voices that called in the night. The frogs were all new to me and some proved later to be new to science. Their voices were fascinating and we found fresh problems at every hand. (p. 485)

Noble practiced night work locally in New York and New Jersey, leading to some new insight on salamanders that he wanted to pass on to Emmett Reid Dunn, as told in the following lines to Thomas Barbour, written in 1920:

Tomorrow Camp and I start for a week-end in the highest mountains in eastern New Jersey. Our chief object will be salamanders. We expect to perfect *our new technique—which is night work* [emphasis added]. It has been my experience that adult salamanders are more abundant than larvae. As a matter of fact they are only more obtainable. During the night the larvae come out by scores from the rocks in the pools . . .

I consider the most essential piece of equipment for frog work a *good* electric light. I am beginning to believe that such a light is as indispensable for salamander work. I want to see Dunn before he leaves . . . if I should miss him, I hope you will give him this bit of dope on technique.

To which Barbour replied,

I shall tell Dunn when he returns about your using a light to collect salamanders at night. It is a scheme I have imagined would be a good one but have never tried it myself.²⁰⁸

Equipment was improving and, on his next trip to the tropics (Dominican Republic, 1922), Noble took acetylene lamps, electric flashlights, and flash powder for night photography. A photograph taken by Ruth Noble shows Noble and his assistant illuminated by the glare of Noble's flash powder in an open flash gun, while he operates the camera and his assistant holds an acetylene "bicycle lamp" pointed at a large tree frog. In the caption to this photograph, Noble (1923e: 108) claimed that

The flash gun, though often used for making portraits of big game, has never hitherto been used for recording the life stories of the small denizens of the tropical forest.

Two years later, in 1924, C. M. Breder was photographing Panamanian frogs at night by this somewhat hazardous method, in which damp tropical conditions tended to cause the powder "to cake in small pellets causing it

to discharge small glowing balls of magnesium" (Breder, 1946: 392).

Noble's article on night hunting for frogs in the Dominican Republic drew an interested query for details from Joseph Slevin at the California Academy of Sciences. Slevin wrote in 1923 to ask what kind of light Noble used, saying that

In one of the pictures [in Noble, 1923e] I note the light is similar to a carbide bicycle lamp . . . which I tried in the Cape Region of Lower California with little or no success. I would appreciate it if you would give me the make of the lamp, candle power etc. Have you ever used in your night work the Nutlight Gasoline Lantern of 300 candle power? This is a wonderful light but has the disadvantage of not being able to throw the light in one direction . . . weighs 3½ pounds.

Noble answered with enthusiasm on the subject of night collecting. His letter shows that he had tried out all kinds of lights then available, and it also reminds us that here was a serious field man:

. . . Perhaps I gave the wrong impression in regard to my field lights. The acetylene lamp that we found most useful is the one shown in the photograph. It is a Solar Bicycle Lamp, and is made at Kenosha, Wisconsin. These lamps are very inexpensive, but satisfactory in every way. I have used two other types of carbon lights but have never found any other kind that was reliable. I have also used many kinds of electric lights, including head-lights, watchman's lights, spot-lights and the various hand-lamps. Any of these are satisfactory for working about home, but my experience in the field has been that an electric light will not stand the wear and tear which is required of it in the tropics. The Nutlight Gasoline Lantern is used extensively by our entomologists. I understand it is very tricky in the field, and Doctor [Frank E.] Lutz tells some amusing stories about tinkering with it under adverse conditions.

For the frog work, it is necessary to have not a strong light, but a soft one. The softer a light is, the less the frogs notice it. I am publishing a little article on the life history of the Anderson Tree Toad [see Noble, 1923i] and in that paper I pointed out, and have given photographic evidence that the activities of the frogs are in no way disturbed by the soft light of a hand-lamp. Light thrown by either a carbide bicycle lamp or by a fair-sized electric light is perfectly satisfactory. If you are intending to take pictures, however, it will be advisable to use a stronger light in order to focus, but for ordinary collecting, the carbide lamp should prove satisfactory . . . if there is any further information you wish in regard to night collecting, I hope you will not fail to call on us.²⁰⁹

By 1922, collecting-instruction leaflets from the AMNH Department of Herpetology

were advising night collecting by use of an "electric flash light, carbide or kerosene bicycle lamp." Soon thereafter, one of the AMNH leaflets was slightly altered by Schmidt for use by the Field Museum, and Slevin (1927: 235) included a paragraph on night collecting in his pamphlet for the California Academy of Sciences.

Under Noble's guiding influence, C. M. Breder went on expedition for the Department in 1924 to the Darién of eastern Panama, where night work was carried on for several months by means of electric flashlight and headlight (Breder, 1925: 333):

At night this forest offered innumerable more difficulties than during the day, but it was only at night that many of the interesting forest denizens were available for study. It was, therefore, necessary for me to carry on most of my work after the twilight hours, while my companions were resting from their diurnal labors about a pleasant camp. In the light of my headlamp many of these forest creatures took on strange shapes and colors. Crocodiles which during the day had lain gazing stupidly out of their greenish eyes, now turned two red coals of fire toward my flash light.

Simultaneous with the above, Pope (1925) apologized from China that "I have not tried the flash-light work so far, but hope to begin before long."

A new technique was coming of age, along with more powerful flashlights and headlights that were capable of throwing strong *focused* beams. Then with experience came the realization (e.g., Shiras, 1935, vol. 1: 439) that the beam of light should preferably follow one's line of sight—the light is best worn on the forehead (or temporarily held alongside the head) not merely to leave both hands free, but to better pick up eyeshine from the creatures that one is hunting (or perhaps vice versa).

Collecting by automobile headlights (Klauber, 1931, 1935) was important earlier in the century and was recommended in the departmental collecting leaflets starting about 1937. One classic study (Klauber, 1931) was based primarily on road kills. Systematic road collecting of live specimens is now hard to justify in regions where the fauna is well known and preyed on by an army of amateur enthusiasts and commercial dealers.

In contrast, collecting by personal headlight continues to be enormously valuable to

surveys of tropical herpetofaunas, the diversity of which remain poorly known at the end of the 20th century, when species are thought to be disappearing without ever having been known scientifically. Students worldwide who have never read Noble are nonetheless following his enthusiastic lead in "delving into the home life" of frogs and many other nocturnal creatures as well.

NOBLE IN THE NEW JERSEY PINE BARRENS, 1919–1922

The year 1919 was an exceptionally busy one for the Department of Herpetology. Dickerson's assistants, Noble and Schmidt, were back from military service and she had them working day and night. But Noble and Schmidt somehow made time that year to do fieldwork together. They went to Lakehurst in the New Jersey Pine Barrens, an earlier destination of Thomas Barbour. Noble would return to Lakehurst over the next several years with other departmental colleagues—Camp, Ortenburger, and volunteer George Sprague Myers—and eventually with his wife, Ruth Crosby Noble. Figures 47 and 48 impart some of the flavor of the New Jersey work.

If the New Jersey fieldwork was a relaxing diversion for Noble, it also was scientifically productive. The Nobles collaborated on a field study of the pine barrens treefrog (*Hyla andersonii*) that resulted in a new model for life-history studies (see Noble, 1923i, in appendix 3). At this time there was no consensus as to the function (if any) of frog vocalization, only a general awareness that male frogs call during the breeding season. Functionality of anuran calls, for example, was a subject avoided in the major works of Boulenger (1897: 61–63) and Dickerson (1906: 18–22) in their chapters on voice, and Boulenger (1897: 68) even denied that there was courtship among frogs, believing that the female is simply "seized by the first comer." A few subsequent papers on toads concluded that females responded to male calls but agreed on little else (for a review of this literature, see Bogert, 1960).

Based on their observations of frogs at night, the Nobles boldly put forth some suggestions (Noble and Noble, 1923: 432 [see



Fig. 47. G. K. Noble at a bog habitat of *Hyla andersonii* in the New Jersey Pine Barrens at Lakehurst (May or June 1922). Photograph by Ruth Crosby Noble. AMNH Photographic Archives 244560.

Noble, 1923i, in appendix 3]) on the role of voice not only in *Hyla andersonii* but in frogs generally:

... voice plays a considerable rôle in bringing the two sexes together. The problem of sex retention is a more difficult one, and can be determined only by careful experimental work.

It will very probably be shown that voice plays a considerable rôle, not only in bringing the two sexes in contact, but also in attracting individuals together to form breeding colonies ... The gregariousness of a species during the breeding season is a function of the attracting power of the call upon males of the same species ... When several species are breeding in one marsh, the species are usually separated into colonies because of the *specific* attraction of the different calls.

The Nobles (op. cit.: 429) also witnessed female courtship in *Hyla andersonii*, concluding that "The female may exercise some choice in the selecting of a mate. The call is not the only factor involved in bringing the sexes together."

Bogert (1960: 217) later was to criticize aspects of the above interpretations, especially that Noble and Noble provided "no

proof of the exclusion of visual stimuli," but he scarcely could discount their conclusion that "Voice plays an important rôle in the mating of *H. andersonii* and probably in other American tree frogs." Noble doubtless would have been fascinated if he had lived to see the modern age of anuran bioacoustics, which his hand-picked successor in the Department, C. M. Bogert, helped to usher in some 40 years later.

Noble maintained a long-term interest in the New Jersey Pine Barrens. In 1932, he wrote that

The United Clay Mines [provided] a house in the village of Crossley ... at the heart of the Pine Barrens ... for supplementing laboratory work on the biology of reptiles with observations in the field.²¹⁰

(See Noble [1934a] concerning field study of *Sceloporus* at the Crossley station, as well as a view of the house.) Noble and his staff appear to have worked out of this field station at least until 1936, when it was mentioned as a base camp for research involving evolution of social habits in vertebrates (Noble,



Fig. 48. From left to right: Herpetology volunteer George Sprague Myers (1905–1985), Assistant Curator A. I. Ortenburger, and Curator G. K. Noble, at Lakehurst, New Jersey, June 1923. Note the acetylene lamps. AMNH Photographic Archives 248830.

The young Myers, 18 years old at this time, was to become an eminent ichthyologist and occasional herpetologist. As a high school student, Myers “sought advice of his biology teacher about a trip he was planning to the Pine Barrens of Lakehurst, New Jersey, to collect the beautiful rare tree frog *Hyla andersonii*. The teacher suggested that Myers discuss his problem with Dr. G. K. Noble . . . By following that advice, Myers became introduced to the world of research zoologists. Noble, impressed, of course, introduced him to A. I. Ortenburger . . . they took him on the last of Noble’s Lakehurst trips to study the life history of *Hyla andersonii* . . . [Earlier] when a young fellow from the University of Virginia was selected by Noble to go with Andrews to collect reptiles in China, Noble and Myers went out to Plainfield, New Jersey with him to teach him how to collect salamanders. His name was Clifford H. Pope” (Walford, 1970: 2–3).

1936m). Some of the laboratory work, however, also was to be done with “animals brought back from Hispaniola.”

THE DEPARTMENT INFILTRATES HISPANIOLA, 1922–1935

“*Hassler is infiltrating in Santo Domingo.*” Years ago, when rummaging through the Archives, I vividly recall being startled by reading that line in some old letter (probably one of Noble’s). Too many espionage novels I suppose, but Santo Domingo *had* had a rather turbulent, conspiratorial history! I had not yet realized that Noble’s method of preparing exhibit specimens, by wax infiltration, had been reduced in the Department to a simple verb devoid of political implication.

The Greater Antillean island of Hispaniola was an important focal point for much of the Department’s early fieldwork, with a total of six expeditions during 1915–1935. Most activity was in the country of the Dominican Republic or “Santo Domingo” (the old colonial name) on the eastern two-thirds of the island, although significant work also was done in Haiti to the west.

As discussed earlier, Dickerson had sent her third assistant, Clarence Halter, to Santo Domingo in the summer of 1915 (the first Department-sponsored expedition outside of the United States), and K. P. Schmidt first came to her attention in 1916 when he offered *his* Santo Domingo collection for her study. The other five departmental expeditions to Hispaniola were made during G. K. Noble’s era, as described below.

1922 ANGELO HEILPRIN EXPEDITION: Assistant Curator G. K. Noble was given administrative charge of Herpetology near the end of 1920. He survived a stressful 1921 and was promoted to Associate Curator (in Charge) in 1922. That same year he took on the planning of a new Reptile Hall. Noble had inherited from Dickerson the philosophy that Museum exhibition work was on equal footing with research and collecting, and he very adroitly combined all three endeavors in his first foreign expedition since joining the American Museum. The new Reptile Hall provided the rationale, as explained in his annual report for 1922 (Noble, 1923p):

Through the interest of friends of the Museum, Mr.

and Mrs. Paul J. Sachs, the donors of the Angelo Heilprin Exploring Fund [memorial to the geologist and philosopher], an expedition was sent . . . to secure materials for the construction of two new habitat groups [giant tree frog and rhinoceros iguana]. Although reptiles and amphibians are most abundant in the tropics, no attempt had previously been made in the Museum to reproduce the home life of forms other than those found in the United States.

The expedition was conducted by Noble and his wife of a year, Assistant Curator Ruth Crosby Noble (Dept. Education), from late July into October or November. One of the resulting exhibits (the Rhinoceros Iguana Group) can be seen in figure 49.

Noble’s description of the astonishing amount of exhibition material obtained is quoted earlier (see New Hall of Reptile and Amphibian Life, under A Century of Exhibition). Noble then continued in his annual report to summarize the other accomplishments:

The expedition secured a large amount of scientific data. The life histories of most of the frogs and toads of Santo Domingo were determined with more or less completeness. A new type of breeding habit was found among the hylids. Observations were made on the development of eight species of frogs and toads. About 3,500 specimens of reptiles and amphibians were secured, including several interesting new species. The photographic results embrace 624 negatives. No one had previously attempted to photograph tropical frogs and toads at night. In this the expedition was highly successful. Both the scientific and exhibitional results far exceeded anticipations.

Noble promptly published five papers on the expedition in the year following, including descriptions of 10 new frogs and lizards (Noble, 1923a, 1923d) and informative accounts in *Natural History* of the work on frogs (Noble, 1923e, 1923f) and on the rhinoceros iguana (Noble, 1923o). It was an important expedition (see also under The “New Technique” of Night Collecting).

1929 KLINGEL HAITI EXPEDITION: Gilbert Klingel financed and personally conducted work in Haiti for the benefit of the Department, primarily to photograph and work out life histories of the lizard fauna. In the opening paragraph of his article for *Natural History* (Klingel, 1929), he claimed motivation from an exhibit related to Noble’s 1922 expedition:

In the American Museum of Natural History there is a habitat group of the rhinoceros iguana, a striking



Fig. 49. The Rhinoceros Iguana Group in 1923. All materials for this striking diorama were obtained by G. K. Noble and R. C. Noble during the 1922 Angelo Heilprin Expedition to the Dominican Republic. Exhibit as photographed in 1923. AMNH Photographic Archives 310201.



Fig. 50. William G. Hassler “infiltrating in Santo Domingo,” 1929 or 1930. Hassler’s expeditions to the Dominican Republic had several objectives, including surveying fauna and supplying living specimens to Noble’s experimental biology laboratories in the American Museum. As seen here, Hassler also took Noble’s technique of wax infiltration into the field in order to prepare specimens for habitat groups in the Hall of Reptile and Amphibian Life, for which new exhibitions were still being prepared well after the 1927 opening date. AMNH Photographic Archives 287510.

West Indian lizard between four and five feet in length . . . I was so much impressed with the group that I decided some years ago to become better acquainted with this beast . . . Last winter I started to try my luck, not in Santo Domingo where the group material was collected, but in Haiti.

In addition to specimens collected, he “secured the first motion picture ever made of the rhinoceros iguana,” which also was presented to the Museum. Klingel’s appetite was whetted for a greater adventure, as described later under the Wreck of the *Basilisk*.

1929–1930 HEILPRIN SANTO DOMINGO EXPEDITION: Seven years after his own 1922 expedition, Noble arranged another grant from the Angelo Heilprin Exploring Fund, this time to send Assistant William Hassler to the Dominican Republic, where he spent about

four months in the field (October 1929–January 1930).

The main purpose of this trip was “to infiltrate reptiles in the field for exhibition purposes” (fig. 50). Three “grouplets” (*Aristoleger*, *Uromacer*, and giant anoles) were obtained for the Reptile Hall. Some 10,000 specimens were acquired, including more than 6000 “lizards and their eggs,” with most of the eggs and many living specimens being shipped alive to the Museum laboratories. Hassler (1930) gave an account of some of the work, including the discovery of the eggs of the gecko *Aristelliger*, which resulted in a small but classic diorama that drew the observer into the scene (fig. 51).

1932–1933 ARMSTRONG SANTO DOMINGO EXPEDITION: Hassler was the leader of this



Fig. 51. Arboreal lizard eggs. Detail of the *Aristelliger* Reptile Egg Group in the old Hall of Reptile and Amphibian Life. This exhibit was based on new discoveries made by Assistant William Hassler during the 1929–1930 Heilprin Santo Domingo Expedition. Photograph from 1931. AMNH Photographic Archives 317748.

four-man expedition (the other members specialized in marine and insect life), with financing from Lorenzo D. Armstrong. The group left New York on June 30, 1932, and Hassler, the last one out of the field, returned in early November of that year. Hassler's main objectives were to continue "studies of the life histories and habits of the reptiles and amphibians of the island," and to visit new sites for collecting.

Hassler (1933) discussed aspects of the expedition routine, and several news notes appeared in *Natural History* in 1932–1933 (32: 443, 555; 33: 104). Noble and Hassler named eight new taxa of frogs and lizards—seven from this trip and one from the 1929–1930 expedition (see Noble, 1933g, in appendix 3).

1935 AMERICAN MUSEUM HISPANIOLA EXPEDITION: This, the most ambitious of the Hispaniola expeditions, covered Haiti as well as the Dominican Republic. It was a 7-month trip, starting in March 1935. Expedition funding from Miss Maud Lewis Fletcher allowed importation of a field vehicle to Port au Prince, as summarized by Hassler (1935):

Equipped with a 1½ ton Chevrolet truck for a traveling base, the expedition made a complete circuit of the island and many short trips, driving nearly 5500 miles over everything from asphalt paved highways to desert wastes. Collecting was therefore carried on under a wide range of conditions, from cool pine forests on mountain-tops over 5500 feet in altitude to the broiling hot shores of Lake Enriquillo, a large salt lake about 140 feet below sea level . . .

The expedition was organized primarily to study the social habits and life histories of tropical reptiles. Experimental methods for this work had been worked out at the American Museum's field station at Crossley, New Jersey . . . Numerous experiments with marked individuals were performed in the field. The results of these studies will be coordinated with the social studies previously made on American species.

Excluding Hassler's (1935) brief summary and a few earlier news notes in *Natural History*, no publications were produced from the 1935 expedition. Noble was perhaps getting overcommitted, and Hassler would eventually resign in the spring of 1937.

WRECK OF THE *BASILISK*, 1930–1931

*Too late now, too late to do us any good.
The breeze that should have carried us to safety
was tearing our vessel apart and spreading our
gear on the bottom of the sea.* (Klingel, 1940)

Gilbert C. Klingel was a dream come true for Noble. Klingel was young, wealthy, enthusiastic about lizards—amateur biologist, photographer, and sailor—and a field man of considerable patience (without which one should really stay at home). Expeditions to him were long "vacations," and he offered his services virtually without condition to the Department of Herpetology and Experimental Biology, first in his 1929 expedition to Haiti (see above) and again in the year immediately following, as Noble advised the Administration early in 1930:

Gilbert C. Klingel, a young naturalist, is building a sea-going yawl the exact duplicate of the famous "Spray." He has presented this ship to the Department together with his services for the period of a year and a half. Mr. Klingel is willing to go anywhere we suggest but is especially interested in taking motion pictures of large lizards. Mr. Klingel's motion picture of Rhinoceros Iguanas is one of the best films in the Museum. We feel certain of Mr. Klingel's ability, both as a sailor and a photographer. The boat is costing more than Mr. Klingel anticipated . . . It has been our hope to be able to send the expedition to the West Indies and Central America.²¹¹

Noble's letter helped to secure some supplementary funding from the Museum. Klingel, whose family operated a wholesale drug company in Baltimore, had something to do with the first years of the Natural History Society of Maryland. The expedition was therefore billed as a joint endeavor between the Museum and the Natural History Society. Noble's (1931a) account of the ship *Basilisk* was in press shortly after she had slipped out of Baltimore in mid-November 1930, headed first for San Salvador. Aboard ship were Klingel and his friend W. Wallace Coleman; the Department's William Hassler expected to join them later in the West Indies.

The little ship, only 38-feet long, headed out of Chesapeake Bay and into the Atlantic—into a raging northeaster that battered them for days, with heavy seas thereafter. They saved their sails but lost their sea anchor and nearly their lives. Their flooded chronometer stopped—they kept off the coast and sailed south by dead reckoning. They had no radio and only much later realized that "larger and better manned ships had gone to the bottom" in that great winter storm.

On December 9, 1930, land was spotted in

calmer weather and they hove to "about eight miles off shore . . . and went below for some badly needed rest." They slept exhausted as an unsuspected current carried the *Basilisk* to a reef:

With a frightening crash we hit . . . Dazed and sleepy, startled by the roar . . . we rushed frenziedly for the deck . . . another swell came from out of the ocean, lifted the ship and with a terrific lurch threw it on one side . . . the rudder snapped off and was washed into the lagoon beyond the reef . . . A wind was coming up, the trade for which we had waited in vain.

After surviving the great storm and 1500 miles of open sea, the *Basilisk* was smashed to pieces in a near calm on the northern point of Great Inagua Island, "a huge, desolate waste uninhabited save for a small settlement near its southwestern tip and a few huts on the northern coast."

Nearly two weeks later, after making their way to the settlement of Mathewtown, Klingel was able to get a four-page letter off to Noble on December 22:

This is perhaps the hardest & most disappointing letter I have ever been called upon to write. I hardly know where to start . . .

We will continue the work of the expedition as long as possible with the limited means at hand and by trading our salvage in return for services and transportation.

I will at the earliest possible moment on my return reimburse you for all loss sustained by yourself and the Museum . . .

The short time we have on the island has shown us that there is much to be done Herpetologically hereabouts. We will do the best we can.²¹²

On December 31, Director Sherwood responded for the Museum, with a cable that buoyed their spirits:

Grateful both safe. Good work. Admire your splendid endeavor fortitude and devotion. Reimbursement unnecessary. Delighted you are working Inagua. Very important Noble writing. Happy New Year.

Noble's two-page letter of the same date followed by ship. It was encouraging:

Your letter was a considerable shock and yet I was greatly pleased to learn the splendid way you have improved the situation. We all rejoice in your safety . . . First of all I must insist that this was our adventure as much as yours . . . We do not anticipate any return of funds and only hope that under your present conditions you may be able to carry on some of the plans you originally had in mind . . . I am sending you your permits for Santo Domingo and am wondering if things are in such a condition that you could

carry on beyond the limits of Inagua . . . A thorough study of the fauna of Inagua should prove of value and if you can carry on some of the tagging work, the principal object of the expedition may be accomplished even yet . . . I have great faith in your carrying on successfully even under these difficult conditions. I only regret that I am so far away that I cannot advise you more exactly at this time.

So, one of two things could be done: Get off the island as soon as possible and go home, or settle in and study lizards for a while. With Noble's encouragement and new supplies from the Museum (including .22-caliber shot cartridges, headlights, and batteries), they chose the latter course, Coleman for a month, Klingel for several months. Some 1700 reptiles were obtained, representing six taxa of lizards and one snake; they found no amphibians.

Their story of survival was told by Klingel (1932, 1940), and the herpetological report was jointly prepared by Noble and Klingel (see Noble, 1932d, in appendix 3). From Inagua, Klingel went to Haiti and Santo Domingo, where political unrest made collecting difficult and where he languished in jail for a time (Klingel, 1940: chap. 12). But he had played the game to the end.

BREDER IN DARIÉN JUNGLES, 1924

My nightly prowls were easily the most delightful part of the entire trip. There is something indescribably fascinating about the jungle at night. (Breder, 1925:333)

The first Marsh–Darién Expedition to eastern Panama resulted in a very successful herpetological venture under Noble's tutelage. However, the Marsh–Darién Expedition fortunately was *not* an American Museum expedition—it would, at least in my eyes, have been a lasting embarrassment. Marsh later interfered in Indian affairs and was accused by the Republic of Panama as having encouraged the San Blas Indians to rebel and declare their independence from Panama. Two expedition members died of disease. The trouble that expedition leader Marsh caused is rather proudly related in his 1934 book, *White Indians of Darien*. I will resist the temptation to digress into *that* subject (but see Howe, 1998).

Richard Oglesby Marsh obtained expedition funding from a "great industrialist, who happened to be a personal friend of mine"

(Marsh, 1934: 39). Funding was ample, and Marsh solicited a representative each from the American Museum, the University of Rochester, and the Smithsonian Institution, as well as a motley assemblage representing Panama and the American military.

Charles M. Breder was on the staff of the New York Aquarium in 1924, and both he and his wife were acquainted with the Nobles. In January, Noble advised the Museum administration that

Mr. Marsh has been desirous of taking an American Museum representative with him on this trip . . . After consultation with Doctor Wissler [in Anthropology] and various other members of the staff, it was deemed advisable to select Mr. C. M. Breder, Jr., of the New York Aquarium to accompany the expedition. Mr. Marsh has kindly set aside the sum of one thousand dollars (\$1000.) to enable Mr. Breder to carry on his work more or less independently . . . Mr. Breder who as you know is chiefly an ichthyologist, will collect reptiles, amphibians and fishes . . . His chief interest will be in bringing together life history material of amphibians and fishes.²¹³

Noble advised Breder on the natural history work to be done, even writing for him four pages of "General Notes on Panama," including techniques of night collecting, so that Breder could effectively utilize his spare time before leaving Colón or Panama City.²¹⁴

February 8 to May 19, 1924, was spent in eastern Panama, mostly in the Río Chucunaque drainage of Darién Province, but the last few weeks were spent in San Blas Territory on the Atlantic Coast. Breder then spent a month in a hospital in Colón, recovering from malaria and typhoid. Noble later advised the Administration of the results of Breder's work:

A magnificent collection of reptiles and amphibians (over 2000 specimens), fishes (1800) . . . The life history of several Darien frogs and some Panamanian lizards were worked out with great detail. *The finest collection of life history data and materials ever made anywhere in Central America was brought together by Mr. Breder and presented to the Museum* [Noble's emphasis].²¹⁵

Noble solicited a general article about the amphibian work from Breder (1925) for a special Fish-Reptile issue of *Natural History* (vol. 25, no. 4), for which Noble was the herpetological editor.²¹⁶ Breder (1946: 381) had planned "to work up the material fully and publish jointly" with Noble, but that col-

laboration never materialized. E. R. Dunn described a few new taxa from the collection, and Breder published the natural history data in an annotated list in 1946. By this time Breder was Chairman and Curator of the Museum's Department of Fishes and Aquatic Biology.

BURDEN, ON THE TRAIL OF DRAGONS, 1926

The dragon concept girdled the earth. And so the thought struck me that dragon stories must originally have been founded on fact, on some beast that actually lived . . . My interest in the subject was aroused by chance. In a course in paleontology at the American Museum of Natural History given by the late brilliant scientist Dr. G. Kingsley Noble, he mentioned . . . a new species of giant lizard which Ouwens named Varanus komodoensis. (Burden, 1960: 171)

A global outdoorsman, W. Douglas Burden (fig. 52) was a young Museum Trustee who affiliated himself with the Department of Herpetology, primarily due to Noble, with whom he developed a lasting friendship.²¹⁷ Burden's expedition for the Komodo Dragon—the world's largest lizard—was at his expense but was conducted under auspices of the Museum and the Department of Herpetology. Noble helped in the planning. Taking a herpetologist to collect for the Department was thought desirable, and, since Noble himself could not spare the time involved, the choice was "Dr. Emmett Reid Dunn, a herpetologist who Dr. Noble felt would be particularly valuable to the expedition" (Burden, 1960: 172).

Correspondence from early 1926²¹⁸ shows Noble acting as intermediary between Dunn and Burden and arranging the acquisition and shipment of the herpetological collecting equipment, including lights for night work. Dunn wrote on February 8:

I enclose equipment list. I have arranged for Bags, and for Brock tins. The rest should be purchased. The small films and the 38 ammunition are for a camera and a gat I have. You will notice that the flashlight stuff and the habitat stuff are to be added. I don't know what is needed there.

Later, however, Dunn wanted to make certain that he would have a headlight and asked if the "Caywood lights [are] headlights [and] are the 3 flash lights Eveready Focussing?"

Dunn met up with Mr. and Mrs. Burden in



Fig. 52. W. Douglas Burden (left) with F. J. Defosse on the Island of Komodo, 1926. Burden, a Museum Trustee and Chairman of a Committee on Herpetology, championed Noble's expansionary plans for the Department of Herpetology and was more influential on Noble's career than is generally realized. AMNH Photographic Archives 338493.

Java. The Burdens first took a side trip from Japan into war-disturbed China to visit with Roy Chapman Andrews and learn something of the Third Asiatic Expedition. They found themselves in an environment whose hostility was evidenced by unruly soldiers and sev-

ered heads along the road, as described in the early pages of *Dragon Lizards of Komodo* (Burden, 1927b). On the way to Java, they stopped in Singapore to pick up the Frenchman F. J. Defosse, described by Burden as "the great white hunter of Indo-China" and

with whom Burden had hunted for two months in 1923.

Defosse was to help Burden trap dragon lizards on the Island of Komodo, which they did. Dunn was to make a general collection, which he did enthusiastically according to Burden (1960: 185):

Beyond the rolling open country surrounding our camp was a big black wood that swept up the steep mountain slopes and merged with the cloud forest above. On entering it, Dr. Dunn saw in the space of a few yards a black cobra, a centipede of enormous proportions, a scorpion, bats, and other creatures fascinating to a zoologist. Defosse disliked the place and . . . cared little about venturing into its depths. Dunn, however, a tall and angular herpetologist, prowled around it for hours on end—lost himself, had a wonderful time, and finally emerged with a smile of glee and a various assortment of venomous creatures that were exhibited in turn to all before being immersed in formalin.

Dunn collected at several ports of call, mostly in the Lesser Sundas, in addition to the time on Komodo. He produced four herpetological reports after the expedition returned (Dunn, 1927a, 1927b, 1927c, 1928b), based on a total collection of "1616 specimens, 73 species, and six subspecies" (Dunn, 1928b: 9). Dunn (1927a) wrote one paper on the size and relationships of *Varanus komodoensis*, concluding that these great and formidable lizards did not exceed 3 m in length, and Burden (1928) wrote another on the habits and distribution of the species. (See Auffenberg [1981] for a long-term field study of this species, the greatest of lizards; his discussion of size seems to corroborate 3 m [nearly 10 ft] as the approximate maximum *confirmable* size, despite claims of more than twice that length).

Burden got his collection of dragons, including a few live ones later exhibited at the Bronx Zoo and several for the Museum habitat group (see fig. 53 and New Hall of Reptile and Amphibian Life, under A Century of Exhibition).

One of Burden's other objectives was to produce a documentary film on the Komodo dragon. This film, widely shown in New York circles, was lent to the Department, which used it to generate income for research (Noble, 1928f): "The curator introduced the film before a variety of audiences and found this new departure in fund-raising the most

successful yet attempted by the Department."

Burden's *Natural History* article (1927a) and his book (1927b) and film were popularizations that altered the exact chronology of events recorded in his journal. Dunn privately voiced objection to this process as used in Burden's *Natural History* article, which was not cited in Dunn's own later-published papers (Dunn, 1927–1928). Mitman (1993: 644–647) examined the correspondence in the Burden–Dunn dispute and discussed Burden's Komodo dragon film in a larger context of "cinematic nature":

In recounting the capture of the Komodo dragon, Burden's task was not, as Dunn believed, to provide a precise chronicle of events. Realism required much more. Burden sought to present an emotional reality, an expressive element that is quickly cast aside in the presentation of scientific data but is essential for capturing the interest of and motivating the lay public. Burden needed to provide an experience for the audience that they would never have in a zoo. He came closest to this ideal in his film of the Komodo dragon expedition . . . Burden, like all documentary filmmakers, had to discover what the film theorist William Guynn calls "the elements of a story in latent form within the real."

Burden, in other words, was practicing editing techniques that are standard and perhaps essential to the numerous "nature films" produced for today's television. Nonetheless, I personally agree with Dunn that such editing was not appropriate to the pages of *Natural History*. Dunn's private criticism found its mark and was responsible for the qualifying note at the end of *Dragon Lizards of Komodo* (Burden, 1927b: 221):

Note: The snaring of the large lizard which eventually escaped was actually not witnessed by any white man. The account as given in Chapter VII has been drawn from similar scenes that were witnessed.

The Museum diorama of the Komodo dragons, as well as Burden's film, attracted public attention and worked their way into popular culture. Humorist and essayist James Thurber mentioned the exhibit in a 1928 "Talk of the Town" column in the *New Yorker* (reprinted in Thurber, 1973: 289):

The new Reptile Hall was officially opened a few days ago in the Museum of Natural History and we



Fig. 53. The Komodo Dragon Habitat Group in the 1927 Hall of Reptile and Amphibian Life. These specimens of the world's largest lizard had been obtained in 1926 specifically for a museum diorama based on Burden's Dutch East Indies Expedition. "*Can we but reproduce in the American Museum group the picture I saw that day, the whole expedition will have been worth while*" (Burden, 1927: 118). AMNH Photographic Archives 311992.

visited it amidst a group of youngsters who kept crying "Good night!" and their mothers who kept murmuring "Mercy!" The place is like that. It might be called the Conan Doyle Hall, with certain exhibits marked: "Strong Influence of Lewis Carroll." Things out of the dead worlds of Sir Arthur's writings and Mr. Carroll's "Looking Glass" are here but you have to accept the word of eminent scientists that they once lived. Place of honor goes to the dragon lizards . . . They look like dinosaurs reduced nine-tenths and, in fact, were spotted for dinosaurs by excited travellers who saw them rear up on their hind legs at a distance and gave the Sunday papers an annual feature story for ten years until the Museum went down and caught a few. The largest is nine feet long.

It is uncertain whether the diorama was the genesis of *Bob and Ray's* "The Komodo Dragon Expert," a New York radio burlesque sketch (later released on record and in televised concert) that entertained audiences during the 1950s or 60s (undated script given in Elliott and Goulding, 1983: 75–77). Although the National Zoo is mentioned, the Komodo "expert" was from Upper Montclair, New Jersey, a commuter's distance from the Museum.

Gregg Mitman has recently revealed that Burden's film was influential in the development of a Hollywood movie classic—*King Kong*! As explained by Mitman (1999):

Fascinated by Burden's expedition to capture and film the dragon lizards of Komodo, [Merian] Cooper imagined a setting for the gorilla film identical to the remote, hard to reach volcanic island described by Burden . . . Cooper began to outline a plot in which a giant gorilla played the feature role. Footage of gorillas shot in Africa could be enlarged in the studio to make the animal appear gigantic in size. The gorilla scenes would then be intercut with magnified footage of Komodo dragons to create fights between the gigantic gorilla and prehistoric beasts.

In Hollywood, Cooper found the need for authentic nature obsolete. Through the triumphs of special effects . . . the entire film [was produced] on the studio lot of RKO. Nevertheless, much of *King Kong* was patterned off Burden's real-life adventure. Carl Denham, the explorer-naturalist-photographer who sets out in search of the prehistoric island, was "a deliberate combination," Cooper wrote Burden, "of you, Schoedsack, and me." Katherine White Burden, who accompanied her husband on his search for the Komodo dragon, furnished the idea for the female lead played by Fay Wray.

BASSLER IN THE UPPER AMAZON, 1921–1931

Dr. Harvey Bassler (fig. 54) was born in 1883 in eastern Pennsylvania. He received his Ph.D. in Geology from Johns Hopkins

University in 1913. He always retained an affinity for his home state—even the preparation of arrow poison in the Amazon would remind him of "an apple-butter boiling" back home. He was nonetheless an explorer at heart, as suggested in his own words:

Spent summer of 1909 with mountaineering party in Selkirks of British Colombia; climbed Sir Donald, made fourth ascent of Tupper and with Dr. Chas. Shaw and one other, made the first crossing of the great snow field between Downie Creek and the N. Fork of the Illecillewalt "The Frozen Ocean" to which reference may be found in Palmer's account of Exploits of Mountaineering in the Selkirks. From 1911–1919 spent my summers with U.S. Geological Survey (during later years as Chief of party), engaged upon geological mapping in Mont., Wyo., Colo., Utah, N. Mex., and Ariz. From 1920 to date with Standard Oil Co. (N.J.) in South America—in 1920 along the *Grand Chaco* of Bolivia, and from 1921 to 1931 in E. Peru as Chief Geologist, directing and engaged in the geological and geographical exploration of the ranges of the eastern Precordillera and the upper edge of the Amazon Plain across Peru from its frontier with Bolivia to that with Ecuador. A part of 1921 was given to the geological mapping of the Lake Titicaca Region and incidentally I climbed El Misti (19,500 feet elev.) in July.²¹⁹

Of interest to Herpetology are the years that this enthusiastic mountaineer spent in the Upper Amazonian lowlands while engaged in a full decade of petroleum exploration in some of the least accessible parts of the continent. Bassler made his base on the Amazon River in Iquitos, from whence he planned and executed major expeditions far up into the headwaters and along the side streams in the basins of the great tributaries Marañón, Huallaga, and Ucayali.

His expeditions, which lasted for months, started on Amazonian steamers, were transferred to progressively smaller launches and dugouts, and then proceeded on foot if they ran out of navigable stream. For example, after a thousand kilometers of river travel, Bassler arrived on June 24, 1929, at the head of canoe navigation on the upper Río Marañón: In tracing his subsequent movements in order to pin down a type locality, I noted (Myers, 1982a: 20) that,

The unique specimen was obtained by Bassler during a memorable trek in which he and a few assistants covered 650 km. (404 miles) of rugged country on foot in 39 days, all the while mapping their trail and making geological examinations along the way—and

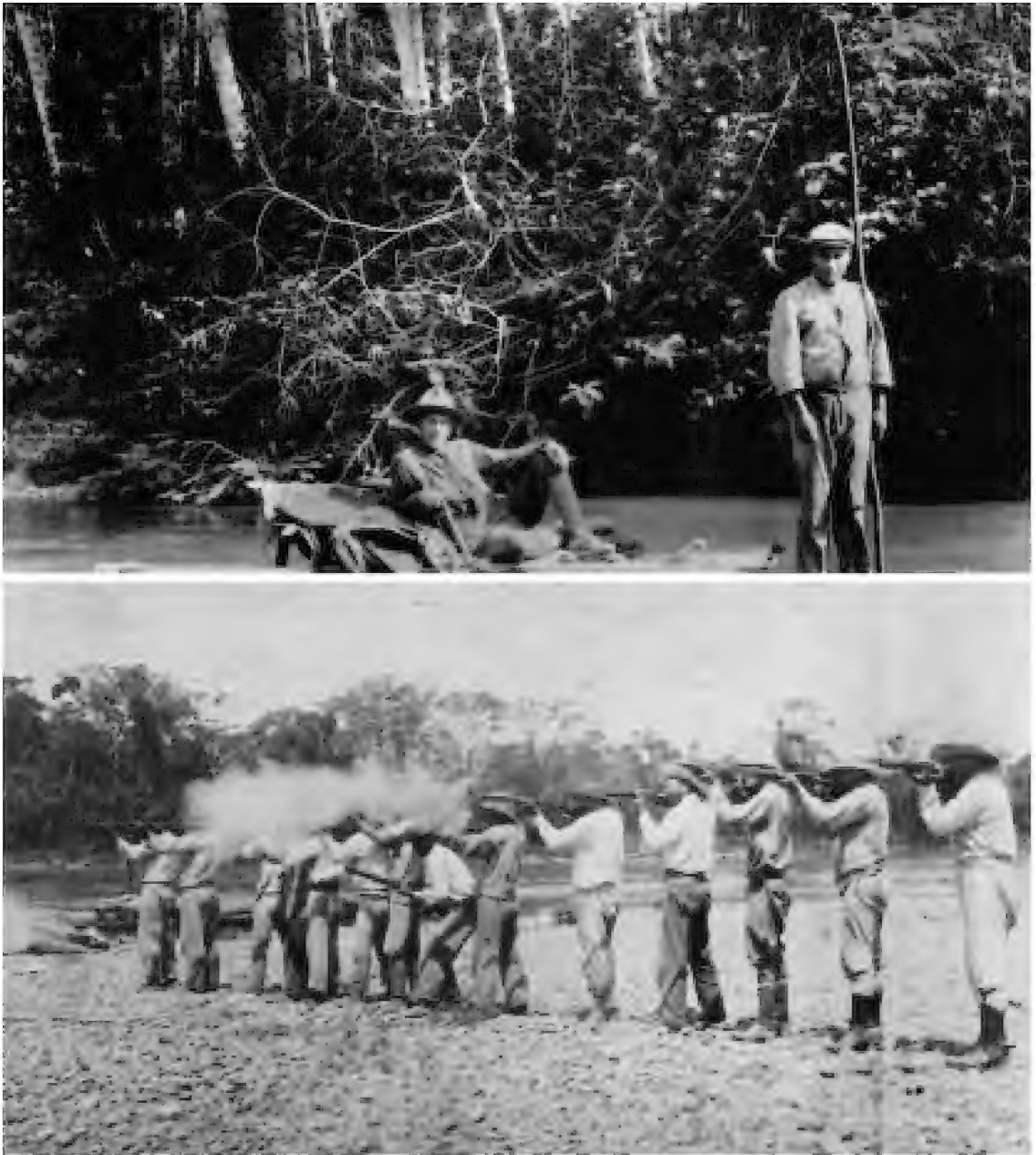


Fig. 54. **Top:** Harvey Bassler (1883–1950), reclining on balsa raft on Río Sarayaquilla in Amazonian Peru (1923). Bassler was a Research Associate in the Department of Herpetology during the eras of G. K. Noble and C. M. Bogert. **Bottom:** A display of fire power by one of Bassler's parties to impress hostile Indians somewhere in the Río Madre de Dios drainage of extreme southeastern Peru (1921–1922). Bassler did much to promote knowledge of South American Indians during his decade of petroleum exploration and herpetological collecting in the upper Amazon. Although his contacts with Indians were nearly always friendly, a few of his pioneer camps came under attack and he believed that *“force is the only law and arms with vigilance furnish the only security from disaster.”* Photographs and unpublished quotation in AMNH Dept. Herpetology Archives, courtesy of the Exxon Corporation.

somehow finding time to collect fossils and to preserve a few frogs and snakes!

His party subsequently made balsa rafts for an exciting trip of nearly 100 km. back down the frequently turbulent Marañón to the upstream head of navigation, where they had left dugouts nearly six weeks earlier.

Needing to trace Bassler's itineraries, I was allowed access, courtesy of the Exxon Corporation, to the still-confidential reports and large-scale maps that Bassler produced for the company (then called Standard Oil of New Jersey). Bassler's mapping was a pioneering effort, and Standard Oil turned over much of the geographical data and coordinates to The American Geographical Society for incorporation in its "millionth maps" of South America. Bassler worked up his professional reports and maps at his headquarters in Iquitos, where he maintained for personal pleasure some live animals and assembled massive anthropological and zoological collections. He developed a special interest in snakes.

Bassler was methodical and considered early on where his herpetological materials should go. In April 1924, Bassler wrote to G. K. Noble, asking him to "please suggest the best ultimate position that I could make of my collection." Noble responded as follows:

I need not tell you that the American Museum would be very happy to receive [the collection]. Further . . . I would be glad to give you a place to work and library facilities, in order that you could report in detail upon your collection.²²⁰

Ten years later, the Museum's annual report for 1934 recorded that the "magnificent Bassler collection of South American reptiles" was received, and that "Doctor Bassler, who presented the collection to the Museum, has been made Research Associate" in the Department of Herpetology. His herpetological collection of some 6600 specimens is extraordinary in including 4200 snakes, which are exceedingly difficult to sample thoroughly in the wet lowland tropics.

Bassler's studies in the Department were interrupted during 1942–1945 when "his services were requested by the United States government in connection with the urgent need for increased rubber production in the

Amazon Basin."²²¹ Bassler had before the war been well along in a study of his huge collection of upper Amazonian snakes, but he never produced a manuscript and was distracted after the war by renewed interest in his ancestry. He acquired ownership of the farm homesteaded by his German ancestors at Myerstown, and built a collection of books and paintings associated with the German colonization of Pennsylvania. While moving part of this library, he was killed in an automobile accident on March 14, 1950.

Harvey Bassler associated himself with the Department of Herpetology after starting to make his extraordinary collection, and afterwards he became a member of the Herpetology staff for nearly two decades. The Department of Anthropology also benefited, having received Bassler's enormous collection of ethnological materials, even though Bassler had earlier subsidized the extensive study of his anthropological collection by a German scholar (Tessmann, 1928, 1930). If Bassler had been collecting for the Museum at large during his time in Peru, his great series of Amazonian expeditions would have to be considered under the following section. The decision was a toss-up.

SOME MULTIDISCIPLINARY EXPEDITIONS

Many of the larger and better financed American Museum expeditions collected on several fronts at once, thus benefiting more than one department. Some of these expeditions have come to be known retrospectively as the "Great Expeditions" owing to their accomplishments and length of time in the field, which was measured not in months but in years. The first of these to benefit Herpetology was started in 1909, the same year that saw the creation of the old Department of Ichthyology and Herpetology.

LANG AND CHAPIN IN THE BELGIAN CONGO

The Lang–Chapin Congo Expedition of 1909–1915 stands out in having been important to Anthropology (Schildkrout and Keim, 1990) as well as to the zoological departments, and yet there were only two collectors. President Osborn obtained the financing from a group of eight New York

businessmen in a rather straightforward way, as shown, for example, by his letter to financier Robert Walton Goelet:

My dear Mr. Goelet:

While abroad last spring I had an interview with the Secretary of the King of the Belgians, Monsieur Carton de Wiart, and secured from him the promise of the support of the King for the explorations of The American Museum of Natural History in the Congo region. The King is interested in this matter, because he has already been sending us some splendid anthropological and ethnological material from the Congo and is very much pleased with our plans for its installation.

I am getting together a group of men in support of our expedition, which will start out in February, and I should be happy to have you become one of the number. Those who have already joined are . . . These have subscribed \$6,000 and we need \$4,000 more to equip the expedition. I hope that you will enjoy becoming one of this group, as we anticipate most interesting results. Our Mr. Lang, who is to conduct the expedition, has had two years in Africa and has shown himself splendidly equipped, both physically and mentally, for this work.

In a letter acknowledging receipt of Goelet's financial commitment, Osborn added,

Since my visit to Belgium and my conference with the Secretary of the King and other Officers interested in the Congo Free State, I have felt that this region offers to the American Museum very exceptional opportunities which could not be found in any other part of Africa, or, in fact, in any other part of the world. I propose now to send Director Bumpus to Belgium to complete our understanding with the Government, so that our explorer, Mr. Lang—a man of rare capacity for work of this kind and of proven experience in Africa—may have all the benefits of official backing.

I am very sanguine of brilliant results from this work, and am glad to have your name associated with it.²²²

President Osborn thus concerned himself with financing and first-level logistics (i.e., diplomacy) in order to set the stage for work in the Belgian Congo. King Leopold II's Congo policies had engendered international outrage, and the Museum took some political heat at the time. What counts for the Museum and Science in retrospect, however, are the many thousands of well-documented specimens on which a large body of literature has been based. As quoted earlier, Mary Dickerson was delighted with the quality of the herpetological collection, which resulted in three major reports by Schmidt (two volumes on reptiles) and Noble (one on am-

phibians) on the Herpetology of the Belgian Congo (see the expedition list for citations).

Herbert Lang and James P. Chapin both collected, but the bulk of the herpetological work probably was done by Chapin (fig. 55), a young Staten Island naturalist who put his education on hold (after finishing two years at Columbia University) for the chance to work in Africa. As summarized by Friedmann (1966),

Chapin, then 19 years old, was asked if he would be willing to interrupt his university studies to go to the Congo for one to three years [as assistant to Herbert Lang] . . .

As it turned out, the tenure in the Congo stretched to a total of nearly five and a half years, one of the longest uninterrupted field assignments in the history of museum expeditions. Lang and Chapin sometimes separated for as much as a year, each working in a different area, but they got on together extremely well. It was a most fortunate choice of personnel as both were industrious, alert, and devoted to the work they were sent to do. Few major expeditions have enriched our knowledge of so many areas of biology as greatly as did the Congo Expedition. The mere bulk of the collections amassed would be impressive alone, but these specimens were all accompanied by meticulous and elaborate field notes, making the results far more meaningful. After the return of the expedition, a summary of the results showed 5,800 mammals, 6,400 birds, 4,800 reptiles and amphibians, 6,000 fish, over 100,000 invertebrates, 3,800 anthropological specimens, or a total of over 126,000 specimens, plus 9,800 photographic negatives and 300 water color paintings of the colors in life of many of the animals obtained, and many volumes of field notes . . .

The expedition had traveled about 15,000 miles on foot without accident or serious sickness in a region then considered to be very unhealthy. It was one of the truly great biological expeditions of all time, and it is understandable that Chapin found a lifetime of work in the study of its results.

Chapin evidently had not expected to be away for more than a year or two at most, for, on November 9, 1909, in one of his first letters to his mother, Chapin wrote that

Mr. Lang now wants to stay out here for two years, and has written about it to Professor Bumpus; but we are still awaiting a reply. Of course it is impossible for me to get back in time to continue at college in February 1910, but I would like to return by the following February. It has taken us an almost incredible time to get out to this place [Avakubi, 26 days from Stanleyville with a large number of porters], and will take almost as long to get back. Such an isolated place can hardly exist anywhere else in the world. A lieutenant, who gets his newspapers by way of East Africa, and consequently much quicker(!) than if they



Fig. 55. James P. Chapin (1889–1964) painting a lizard during the 1909–1915 American Museum Congo Expedition. AMNH Photographic Archives 36617.

came up the Congo, has lately informed us that Cook claims to have discovered the North Pole. This is about the only news of the rest of the world we have heard . . .

There is a mission here, with two priests, who often shoot birds for us, even on Sunday . . . In a few days now we start for Makala, a post four or five days march to the south of here. There used to be a famous native hunter there, who had killed six or seven okapis . . . Unfortunately he is dead now and we cannot secure his assistance. We have already a few pieces

of okapi skin, made into straps for guns and knives by the natives.²²³

The accomplishments of Lang and Chapin's five and a half years in the Congo puts this firmly among the Museum's "Great Expeditions." Three-quarters of a century later, we can scarcely fathom the magnitude of their travel arrangements and record keeping—showing, for example, that some

38,000 porters were paid by the expedition (Lang, 1919: xxii)—nor can we easily comprehend their sense of isolation and remoteness. But they did not dwell on problems. Chapin's letters home reassured his mother that he was getting a well-balanced diet, with plenty of fruits and vegetables, and he later felt (as quoted from Friedmann, 1966: 245) that he had been "mighty fortunate to be able to profit by the best half century that equatorial Africa ever offered to a naturalist, when the country was new, yet safe for travel."

Unlike the Congo, however, vast parts of the Amazon Basin on the other side of the Atlantic were not so amenable to travel, as soon learned by another AMNH expedition.

ROOSEVELT, MILLER, AND CHERRIE IN BRAZIL

What started as the Roosevelt South American Expedition of the American Museum of Natural History is usually remembered as the 1913–1914 Roosevelt–Rondon Brazil Expedition. It was not until Roosevelt's party was in Brazil that it was decided he would join Cândido Mariano da Silva Rondon (fig. 56) in exploring the Rio da Dúvida (River of Doubt), which had been discovered by Col. Rondon during the course of building a telegraph line across Mato Grosso and into what is now the west Brazilian State of Rondônia. Theodore Roosevelt was accompanied by veteran American Museum collectors Leo E. Miller and George K. Cherrie. As relayed by Miller (1915: 49),

The plan of the expedition, fully decided upon after consultation with the Brazilian Government on arrival at Rio de Janeiro, took shape as follows: to ascend the Paraguay to the highest navigable point, cross the vast breadth of Mato Grosso on mule-back and descend the unexplored Rio da Dúvida with zoölogical collecting as we moved along or as opportunity presented itself.

Miller and Cherrie collected extensively during stops on the exhausting 5-week-long cross-country trip of about 800 km, during which many pack animals had to be shot and much baggage had to be abandoned. In addition to sports hunting, Col. Roosevelt also shot specimens, and his son Kermit helped with the skinning and preparation. Ultimately, the expedition was to split into two par-

ties, one for the Rio da Dúvida and the other for the Rio Gy Paraná (Jiparaná).

The Dúvida party included Col. Rondon, one of his lieutenants, and an army physician on the Brazilian side, and the 56-year-old Roosevelt, Kermit Roosevelt, and George Cherrie on the American side—with 22 others including boatmen and a few soldiers. One of the boatmen drowned in the Dúvida and one soldier was murdered by another, who presumably perished after fleeing into the jungle. Thoughts of collecting were forgotten as the party struggled on for two months downriver, malnourished, threatened by illness, and worried by the presence of unseen, potentially hostile Indians who killed one of the party's dogs. There were difficult portages around waterfalls and unnavigable rapids, and many days were lost in making new dugouts to replace those smashed beyond repair. The elder Roosevelt came out with an infected leg and burning fever, which would recur and perhaps contribute to his death five years later. Cherrie's concise narrative of this most difficult journey was later published in Naumburg (1930: 10–21; see also Roosevelt, 1914, and Cherrie, 1930).

Meanwhile, Leo Miller, two officers, a geologist, a taxidermist, and "a number of natives" proceeded overland for an additional three days to the Rio Comemoração de Florianópolis, a headwater of the Jiparaná, where they obtained a large dugout after a wait of two weeks and made their way down to the Madeira and on to Manaus. Miller got in some collecting on the Madeira and, since his party arrived at Manaus well ahead of the Dúvida party, he collected on the Amazon for an additional several weeks.

The Roosevelt–Rondon Expedition spawned a number of technical reports that greatly increased knowledge of part of the Brazilian back-country, which was being opened up by men such as Rondon. The main contributions derived from the Dúvida segment of the expedition were geographical in nature. But a magnificent collection of a few thousand birds and mammals was obtained from other areas, as was a small number of reptiles. Although insignificant to growth of the herpetological collections, all Museum departments were to reap an obvious benefit from this expedition. The asso-



Fig. 56. **Left:** Cândido Mariano da Silva Rondon (1865–1958), military engineer and builder of telegraph lines through Brazilian wilderness and founder of Brazil's acclaimed Indian Protection Service. **Right:** Theodore Roosevelt (1858–1919), naturalist and 26th President of the United States. After his unsuccessful bid for reelection in 1912, Roosevelt initiated a South American expedition under the auspices of the American Museum of Natural History. After arriving in Brazil, Roosevelt's party was invited to join up with a Brazilian contingent headed by Colonel Rondon. Their objective was to explore Rondon's *Rio da Dúvida* (River of Doubt) to its unknown destination. The *Rio da Dúvida* proved to be a tributary of the Madeira and was renamed in Brazil as Rio Roosevelt. Photograph by George K. Cherrie. AMNH Photographic Archives 218608.

ciation of "Teddy" Roosevelt with an American Museum expedition (financed by Roosevelt and AMNH trustee Cleveland Dodge) enhanced the steadily growing public awareness that the Museum was a major center for scientific exploration—an image immensely important for Museum fund raising in furtherance of expeditionary work.

Herpetology's Mary Dickerson was instrumental in advancing this perception of the Museum in her role as Editor of *The American Museum Journal* (= *Natural History* starting 1919), which carried a constant stream of articles and news notes about Museum expeditions. Thus, the start of the Museum's Roosevelt Expedition was announced in the October 1913 issue of the *Journal* (Chapman, 1913). Next year, issues of volume 14 of the *Journal* printed one of Roosevelt's letters from the field (p. 145; see Osborn, 1914), news notes from the expedition (pp. 78, 269), a photograph of Roosevelt and Rondon (p. 171), an announcement that Roosevelt had "arranged to give to Members of the American Museum in the fall the first presentation of the zoölogical results," and another photograph of expedition personnel (pp. 213–214). In the third year (vol. 15, 1915), the February issue of the *Journal* had on its cover a photograph of "Colonel Roosevelt in South America." By turning pages, the curious reader would find illustrated reports on the expedition by Roosevelt himself and by Miller (see Miller, 1915, and Roosevelt, 1915), as well as a review (Allen, 1915), from the zoological viewpoint, of Roosevelt's hastily written book, *Through the Brazilian Wilderness* (1914). An analysis of the geographical significance of the expedition appeared in the following (March) issue of the *Journal* (Joerg, 1915). Dickerson managed to produce a memorial issue for the same month in which Roosevelt died (January 1919), concurrent with the *Journal*'s name change to *Natural History*.

Although he was not to return to South America, Roosevelt in the next few years financed two separate Museum collecting expeditions for Miller and Cherrie (e.g., see Cherrie, 1917: 269). After some five years of nearly continual South American fieldwork, Miller served in the military from late 1917 to early 1919. Roosevelt had encouraged

Miller to write an account of his South American adventures, and the manuscript for *In the Wilds of South America* was finished and published in 1918 while Miller was still in military service. Miller's closing sentence revealed a yearning to return to fieldwork for the Museum: "Speed the day when I may again eagerly scan the horizon for a first faint tinge of its [South America's] palm-fringed shore line!" But Miller resigned from the Museum at the end of May 1919, only a month after his return.²²⁴

Cherrie published his own recollections of the Roosevelt–Rondon expedition years later in the final chapter of his autobiographical *Dark Trails* (1930). In looking back on his life, the goal for Cherrie seemed not to have been the collections or knowledge gained—things which he scarcely mentions—for him, at least in memory, it was hard travel and life on the edge.²²⁵ With that perspective, we can perhaps understand his despair in later life:

Soon, with aviation, the globe will all be nicely catalogued and known. The thread of the traveller's romance will be broken forever—until man essays the planetary spaces. For this reason, and because life is but a brief and often arduous journey, I am glad that I am over the hill. (Cherrie, 1930: 8)

ANDREWS AND POPE IN CHINA

Like Cherrie above, Roy Chapman Andrews (1960: vii) also remembered in his later years as having had "a thirst for adventure, and the insatiable desire to see what lay beyond the horizon's rim in the little-known places of the earth." In writing about AMNH Trustee Douglas Burden, Andrews also wrote of himself:

During the days of his youth, like all explorers, he was completely indifferent to what the city dweller considers to be the essentials of comfort. No bed was ever as desirable as a sleeping bag beside a campfire. He loved the night wind on his face and to look up at the stars. Then, he felt closer to the wild creatures of the forest than to man. I know, because it meant the same to me.

Many times when I was bone-tired, cold or miserably wet, I have asked myself why I was punishing my body to collect one particular animal. It was, I have admitted wearily, because I am a primitive at heart. (Andrews, 1960: viii–ix)

It can be taken for granted that only the adventurous were likely to be drawn to the Mu-

seum's expeditionary work, but the *verbalization* of that spirit usually had to await the reflections of old age. When the mission was scientific, the work to be done required that "adventure" be avoided by careful preparation. Compare Andrews' musings above with his less romantic, more professional outlook 28 years earlier, as he summarized in *The New Conquest of Central Asia*, an account of the most famous of the Museum's Great Expeditions:

I do not believe in hardships, if they can be avoided, for they lessen effectiveness; they are a great nuisance. Eat well, dress well and sleep well is a pretty good rule for everyday use. Don't *court* hardships. Then you can work hard and steadily, and, if a bit of "hardship" does happen in the course of things, you are ready to take it in your stride and laugh while it continues. With us it simply meant sending out a few more camels to carry the extra load of supplies, food and equipment which made just the difference between comfort and discomfort.

Neither do I believe in adventures. Most of them can be eliminated by foresight and organization. My friend Stefansson, the Arctic explorer, has a motto which I am very fond of quoting because it expresses a great deal in a single sentence. He says "Adventures are a mark of incompetence." If the explorer has a clear-cut problem to solve, and an honest desire to contribute something of worth to the world's knowledge, he will prepare against adventures. It will disappoint the newspapers, but facilitate his work. How infinitely more creditable it is to eliminate difficulties through foresight and preparation before they are encountered, than to suffer heroically and leave the work half done! (Andrews, 1932: 15)

After winning the enthusiastic approval of President Osborn, Andrews was to display formidable organizational skills in planning and conducting the First (1916–1917), Second (1919), and Third (1921–1931) Asiatic Expeditions, collectively called the Central Asiatic Expeditions (although work also was accomplished in southern China and northern Burma). Herpetological material was secured by Andrews starting with his first trip, but the Third Asiatic Expedition was to become the only one of the Great Expeditions to put a herpetologist in the field. That, however, seems to have been fortuitous.

Pope, a student at the University of Virginia, wished to volunteer to serve without compensation on a Museum expedition. After spending a summer at the Bronx Zoo, Pope was recommended to the Museum by Raymond L. Ditmars, who wrote to Director

Lucas, and by Charles A. Stone (President of the American International Corporation), who wrote a rather demanding letter directly to President Osborn in early 1919:

Dear Professor Osborn:

Mr. Clifford H. Pope, who is a nephew of Mr. George J. Baldwin, a very old friend of mine whom I have known both in a personal and business way for many years, and who is now Senior Vice President of the American International Corporation, is, I understand, anxious to become connected with the American Museum of Natural History so that he may serve as a member of one of the Museum's expeditions as an assistant without compensation. It occurred to me that a letter from you to Dr. Lucas would have great weight and if it is not too much trouble to you, I would be very much obliged if you would write one for him.

Mr. Pope is devoting his time while in college to the study of zoology and spent his summer holidays as a student of animals working with the keepers at the Bronx Zoological Gardens. A letter which Mr. Ditmars has written to Dr. Lucas in this connection, of which I have sent a copy, speaks very highly of his work there.

If you can help Mr. Pope out in this way, I will consider it a great favor.

Osborn, who replied almost immediately, was diplomatic and noncommittal:

My dear Mr. Stone:

. . . I shall take great pleasure in putting his name down among the volunteers who from time to time apply for membership in our expeditions. All young men who have these tastes should certainly be encouraged, because they are the stuff from which the naturalists of the future will arise—the men who will have to take the place of our beloved Theodore Roosevelt [Roosevelt, a personal friend of Osborn and a patron of the Museum, had just died].

I regret that there is not a present prospect of a very active condition of work in the field; on account of the war we have had to temporarily diminish our field work. I take pleasure in writing Director Lucas, however, and I know that he will do what he can.

There was a subtle interplay in these letters between a potential donor and Osborn, who passed the matter on:

Dear Director Lucas:

I enclose a letter received from Present Charles A. Stone, a very influential man, and I hope that you will place the name of Mr. Clifford H. Pope on our list of volunteers for future expedition work, in case any opening occurs where his training would be of value.

We have not been uniformly successful with our volunteer workers, but I think it is distinctly one of the duties of the Museum to encourage requests of this kind and to give the volunteers a trial.

I hope that you will write Mr. Pope a few lines of encouragement.²²⁶

Pope talked with Lucas and then went on to spend summer vacations working on "fish habits" in British Guiana, in 1919 and 1920, under the auspices of William Beebe. He also went collecting in New Jersey with Noble and Herpetology volunteer George Myers, evidently in anticipation of work with Andrews in China. Although I find no corroboration that Noble actually "selected" Pope for the Asiatic trip (see quote in fig. 48 legend), Noble might have been asked for an evaluation of Pope's potential. Between early 1919 and 1921, Noble and the Museum would have viewed Pope only as a promising, politically well-connected student. Bogert (1975: 22) misleadingly indicated that Pope had not applied for a position until 1921, and Adler (1989: 94) further overstated the matter in saying that, after graduation, Pope "applied for and won a position as 'Herpetologist, Chinese Division.'" A decision was made before his graduation for Pope to go to China, with the indefinite title of "Assistant" to the Leader/Zoologist of the Third Asiatic Expedition, Roy Chapman Andrews; the title "Herpetologist" came later.

Pope's outside recommendations brought him to the Museum's attention, but that alone would not have won him a spot. He evidently made a favorable impression on Andrews, who cautiously made a place for the young Pope. Andrews arrived in Peking (Beijing) on April 14, 1921. Pope graduated with a bachelor's degree from the University of Virginia in May and sailed from San Francisco on May 31²²⁷ with Mr. Walter L. Granger. Pope and Granger arrived at the Headquarters Compound (part of which is shown in fig. 57) on June 28; during that summer, Andrews "initiated me into the art of collecting reptiles and amphibians in China" (Pope, 1932: 470). The initiation occurred on a short trip started in late July, when Andrews took Pope to the "Tungling or Eastern Tombs region" northeast of Peking, where a remnant of forest "still harbored many interesting animals exceedingly rare or completely extinct in the adjacent parts of northeastern China" (Pope, 1935: 4). Pope wrote:

Plans for actual collecting were soon completed, and on July twenty-seventh Doctor Andrews and I set out for the Tungling region, where I was to learn as much Chinese as possible as well as receive training in the methods of collecting in China [p. 4] . . . it had been originally planned that during the remaining months of 1921 I should accompany Doctor Andrews on his trips into various parts of northern China [but] it became evident after my return from the Tungling region that there was nothing to prevent my launching out to more southern provinces on my own account [p. 5].

Although it was originally planned for me to act as general assistant to Doctor Andrews, it soon became evident that there was nothing to hinder my working alone and independently as a collector of reptiles, amphibians, fishes and mammals. With a special fondness for reptiles and an ever increasing interest in amphibians, I naturally spent most of my time and energy in the field of herpetology. Other members of the expedition also secured reptiles and amphibians and thus a very large number was brought together. (Pope, 1935: v)

Pope's quickness in learning Chinese and in starting to master the arts of collecting and negotiating in this ancient culture must have been a relief to Andrews, who later was able to recount Pope's work with great satisfaction (Andrews, 1932: 19–20):

Since Mr. Pope was unfamiliar with the Chinese language and the methods of collecting fish and reptiles in China, I took him with me on a short expedition . . . [which] also gave me an opportunity to train several Chinese assistants in zoological collecting. My plan was to have Mr. Pope make a survey of the herpetology and ichthyology in every province of China proper, because Mongolia is so cold and dry that its reptilian fauna is exceedingly limited and I could do the necessary collecting there. The results of Pope's careful and enthusiastic labor already have produced, by far, the largest and most complete collection of fish, reptiles and batrachians that has ever been made in China. [He also collected mammals.]

After returning from Tung Ling in August, 1921, Pope went to Anhwei Province and spent the winter of 1921–1922 in the region of the interesting Tungting Lake, Huan. He made an expedition to Shansi and to the border of the Ordos Desert in the summer of 1922. He spent the year 1923 on the little known island of Hainan, southwest of Canto. Later he collected for many months in Fukien Province. At times he conducted his work under the most dangerous circumstances. In 1922, in Shansi, he was in a city that was captured by bandits, yet, by his tact and courage, he not only saved his life and collections but continued his work. On the island of Hainan it was highly dangerous to go beyond narrowly circumscribed limits, because the region swarmed with brigands; yet he remained a year and brought out a superb collection. He learned the difficult Chinese language so well, and has such a sympathetic and thorough understanding of the people, that I consider him one of the best



Fig. 57. Staff of the Third Asiatic Expedition in their headquarters compound in Peking (Beijing), September 1922. *Front row, left to right:* Walter Granger (Chief Paleontologist), Roy Chapman Andrews (Expedition Leader and Zoologist), Charles P. Berkey (Chief Geologist), Frederick K. Morris (Geologist). *Back row, left to right:* J. B. Schackelford (Photographer), Clifford H. Pope (Herpetologist), James Wong (Assistant and Translator), S. Bayard Colgate (Chief of Motor Transport). AMNH Photographic Archives 108639.

equipped field men for that country whom I have ever known.

With Pope clearly an asset rather than a potential problem, Andrews was able to spend the rest of the winter of 1921 making his complicated arrangements for Mongolia, for which he had added the novelty of automobiles to his caravans of camels. He was ready to move his technical personnel by April 1922, at a time of continual troop movements, when "war clouds were gathering thickly in north China skies" (Andrews, 1932: 21); however,

The headquarters seethed with activity. Every man was occupied with his own individual preparations for the long summer in the desert. The courtyard in front of the main laboratory was strewn with skins, boxes and equipment, which were being packed for shipment to New York or to go with us to Mongolia. Colgate had the front court filled with cars, and all

day the whirl of motors being tested and the ring of hammers made it seem like an open-air garage. As if to bid us Godspeed, the lilacs and flowering trees in the courtyards, in bloom almost a week earlier than in any other part of the city, transformed the compound into a veritable paradise.

Pope had been working independently for some months by now. His hope, however, of working in every province was too ambitious. Nevertheless, he collected extensively on the southern island of Hainan and in six or seven (of 20) mainland provinces in the eastern half of China, over some 20° of latitude. Among others who may have collected, he singled out paleontologist Granger for obtaining valuable specimens in the more western provinces of Szechwan (Sichuan) and Yunnan, as well as for bringing material down from Mongolia. Pope also collected fish and devoted some winters mainly in col-

lecting mammals. He worked in China from the spring of 1921 until late 1926, returning to New York at least twice during this period (Andrews returned yearly for fund-raising activities).

There was no thought originally that Pope should publish on the collections he was making. Initially that was the job of Assistant Curator Karl P. Schmidt. Although Schmidt left New York for the Field Museum of Natural History in 1922, he continued working on Pope's collections, publishing a few *Novitates* in 1925 and three American Museum *Bulletins* in 1927. As summarized by Pope (1935: v),

As soon as good series of specimens reached New York, Mr. Karl P. Schmidt began to study them and continued to do so until he had reported on approximately half of the entire collection in three main papers . . . After the completion of my field work in 1926 and my final return to New York, Mr. Schmidt ceased to study the material, and turned it over to me for further investigation. It is largely due to the extremely thorough and conscientious beginning made by Mr. Schmidt that I was enabled to pursue the work.

Pope does not indicate if he was aware that Andrews had earlier asked Noble to see about acquiring the services of a professional herpetologist who could bring to completion an elaborate monograph on the Chinese material, with Pope assisting in the work. In January 1924, during one of Pope's winter respites in New York, Noble wrote to Remington Kellogg of the U.S. Biological Survey:

Dear Kellogg:

The third Asiatic Expedition is back from the field with the largest and finest collections of Reptiles and Amphibians ever secured in Asia.

It is the plan of Mr. Roy Chapman Andrews to publish a series of memoirs elaborately illustrated with numerous colored plates embodying the results of the expedition. A Chinese artist has prepared many sketches in the field from which the plates may be made. Mr. Clifford Pope, the collector and field zoologist is now in this Department re-arranging the material in preparation for intensive study.

Mr. Andrews is desirous of securing the services of a competent herpetologist to study and report on this material. Would you consider coming to us for a year or more to make this study? Mr. Andrews would be pleased to take the matter up with Doctor Nelson if you are agreeably disposed. It seems to me that this is a most unusual opportunity, for not only will a magnificent collection be at your disposal, but you will have the assistance of the collector, Mr. Pope. Colored drawings of most of the species and photo-

graphs of some are available for your report. You will be able to devote your entire time to research on the material. I might add that this whole proposition has arisen very suddenly, and I have applied as abruptly to you for I would personally be very happy to have you near at hand, if only to discuss herpetological matters now and then.²²⁸

The above should not be considered underhanded or unfair to Pope, who had not yet demonstrated the ability to conduct the museum part of a faunal study. Pope's first paper (1924), a popular account of his work in Hainan, had not yet been published, and his first taxonomic papers on Chinese material were not to appear for several more years. In any case, Noble failed to draw in a "competent" herpetologist, and Pope got his chance. His *Reptiles of China* (1935) is an admirable, even extraordinary work written on the basis of intensive field experience, thorough literature review, and study of nearly all reasonably accessible museum material (made possible by Andrews, who provided Museum financing for Pope's travel to European and American museums). It remains more than 60 years later as the most definitive treatment on China's reptiles in any language, being "still the most comprehensive book on the topic" (Zhao and Adler, 1993: 33).

THE WHITNEY SOUTH SEA EXPEDITION

The Whitney South Sea Expedition of the American Museum, financed by Mr. Harry Payne Whitney, covered the greater part of the Pacific Ocean over a span of two decades. Officially, it lasted from September 1920 to October 1939,²²⁹ although it trickled on into 1941. The first field leader of this ambitious program was Rollo Howard Beck (1870–1950), a veteran ornithological collector (see Murphy, 1924; Beck, 1936). After initial work on Tahiti and neighboring areas, the 75-ton auxiliary schooner *France* (fig. 58) was purchased, which gave the expedition unusual mobility and independence "of the uncertain movements of trading craft." Although the first target was birds, many reptiles were collected; after only two years, Murphy (1922: 704) reported that

A collection of reptiles, including lizards from nearly all the islands visited, as well as marine turtles. Although the lizards are represented by but a small number of species, the aggregation constitutes one of



Fig. 58. The power schooner *France* on a calm sea. This vessel, of seventy-five tons burden, with a sixty horse-power engine, was purchased in Tahiti in 1921 for the Whitney South Sea Expedition. AMNH Photographic Archives 107943.

the few collections sent to the United States from Polynesia since the days of the Wilkes Expedition of 1828–1834. A duplicate set of reptiles has been forwarded to the Bishop Museum.

Although Beck left the expedition in 1928, the work was carried on by others. The *France* was sold in 1932. Proceeds from the sale were used to finance further collecting, especially by Lindsay Macmillan, who collected in the New Hebrides (1935–1937), the Loyalties (1937–1938), New Caledonia (1938–1940), and in Australia (1940).²³⁰ Work was effectively closed down by World War II. As noted in correspondence by C. M. Bogert,

No log of the Whitney Expeditions ever was published, and it probably would not be of much help anyhow since collections were sent in by miscellaneous collectors employed by the expedition even after it had returned. In fact, I was receiving occasional shipments up to the time of Pearl Harbor.²³¹

Early herpetological materials from the Whitney Expedition were reported by assistant curators Schmidt (1921e, 1922c), Ortenburger (1923a, 1924a), Burt (1930a), and Schmidt and Burt (1930). Assistant Curator Burt and his wife (Burt and Burt, 1932a) published a more comprehensive report on all amphibians and reptiles collected during the first decade of the expedition. The quality of Burt's work unfortunately has been considered suspect in the Department. Continuing in the letter cited above, Bogert said that

Your difficulties with Burt's paper are similar to those of Dunn who tried to use Burt's paper on South American lizards. It is doubtful whether Burt ever looked at a map. Looking up localities is too time consuming for anybody who was as anxious to pile up pages as Burt was.

Although hardly factual, this Bogertesque comment is telling on the impression that Burt's year in Museum employ left on curators who followed him. Nonetheless, Burt and Burt's treatise—with several maps and a list of more than 200 islands from which herpetological material was collected during the first decade of the expedition—is an important and essential starting point for an overview of the collection. A subsequent worker who has made good use of Whitney Expedition materials in the Department of Herpetology is former visiting scientist and current Research Associate Samuel McDowell

(e.g., see McDowell, 1970). The collection remains as a marvelous testimony to the time of the Museum's Great Expeditions. An unpublished itinerary and index to the expedition journals was prepared in 1969 (Bryan, MS), although it is incomplete in lacking reference to Lindsay Macmillan's late work.

THE NEW GUINEA EXPEDITIONS

American Museum zoologists have long been attracted to rugged New Guinea—the world's second largest island—with most work having been conducted in the eastern half of the island and its nearby island groups (i.e., the present nation of Papua New Guinea). The Whitney South Sea Expedition (see above) had important forays to New Guinea, but the herpetological results were negligible. The principal work overall was conducted by the Archbold and Gilliard expeditions, and by Curator (now Emeritus) Richard G. Zweifel. These expeditions are outlined below, but attention should first be called to important supplementary herpetological material that was provided through the expeditions and fieldwork of Fred Parker (nearly 4000 specimens) and Jared M. Diamond (some 1200 specimens; e.g., see Diamond, 1967, 1969).

ARCHBOLD EXPEDITIONS: Richard Archbold (1907–1976)²³² financed and sometimes participated in seven expeditions to New Guinea in the period 1933–1964. The first several expeditions were retrospectively numbered. The second expedition, called the “Archbold Fly River Expedition” in Archbold and Rand (1940), initiated the expeditionary use of airplanes for parachuting supplies to remote camps. The third expedition “was a joint undertaking with the Netherlands Indies Government [and was] known officially as the Indisch–Amerikaansche Expeditie naar Nederlandsche Nieuw-Guinea” (Brass, 1956: 83). These were competently run, well-documented expeditions that amassed large collections of terrestrial vertebrates and plants. The First to Seventh Archbold Expeditions to New Guinea were conducted in the years indicated below (with a reference to the published itinerary and summary for each):



Fig. 59. Curator Richard G. Zweifel on his first New Guinea expedition (at Mt. Rawlinson, 1964). AMNH Dept. Herpetology Archives.

- 1st, 1933–1934 (Archbold and Rand, 1935)
- 2nd, 1936–1937 (Archbold and Rand, 1940; Rand and Brass, 1940)
- 3rd, 1938–1939 (Archbold et al., 1942)
- 4th, 1953 (Brass, 1956)
- 5th, 1956–1957 (Brass, 1959)
- 6th, 1959 (Brass, 1964)
- 7th, 1964 (Van Deusen, 1978)

Richard Zweifel (see below) is the principal authority on the collections of frogs and lizards accumulated by the Archbold and other American Museum expeditions to New Guinea, whereas our mutual colleague Samuel McDowell effectively utilized the snake specimens in a series of major papers (Mc-

Dowell, 1967, 1969, 1970, 1974–1979, 1984).

THE GILLIARD EXPEDITIONS: Seven smaller scale expeditions to New Guinea were conducted by Ornithology Curator E. Thomas Gilliard (1912–1965 [see Murphy and Amadon, 1966]) in the period 1948–1964 as follow (these expeditions have never been known by number; citations are to reports containing itineraries and habitat information; an asterisk indicates explicit reference to herpetological material having been obtained):

1. 1948 (Gilliard, 1950)
2. 1950 (Mayr and Gilliard, 1954*)
3. 1952 (op. cit.*)
4. 1953–1954 (Gilliard and LeCroy, 1961*, 1966*; LeCroy, 1975)
5. 1957 (no report)
6. 1958–1959 (Gilliard and LeCroy, 1967a*, 1967b*; LeCroy, 1972*)
7. 1964 (Greenway, 1966; Gilliard and LeCroy, 1968, 1970)

ZWEIFEL'S NEW GUINEA WORK: Curator Richard G. Zweifel (fig. 59) got involved with the New Guinea collections through routine curatorial work in the 1950s. He subsequently added value to these collections by means of publication and his own fieldwork. Zweifel undertook four expeditions to Papua New Guinea for the express purpose of collecting amphibians and reptiles and studying them in their natural habitats, and on one expedition he participated for a time in a concurrent Archbold Expedition.

Zweifel's first expedition was in 1964, partly with the Seventh Archbold Expedition; his second was in 1968; his third was in 1969 as a participant in the NSF-sponsored Alpha Helix New Guinea Expedition; and his fourth expedition was in 1987.

Zweifel accrued over nine months in the field, accumulating some 4000 specimens and quantities of documentary photographs, field notes, and tape-recordings. He has described some 50 new species-group taxa and two genera from New Guinea. His numerous papers on the fauna are all listed in appendix 4. The value that fieldwork can add to systematic studies can be seen in many of these papers (e.g., Zweifel 1972a, 1980c).

Zweifel's work and that of other participants in the New Guinea expeditions illus-

trate well what Ornithology's Frank Chapman (1922: 311) meant by Museum "policy":

A specimen is of far greater value to the man who is familiar with the country whence it comes and the conditions under which it lives, than to one who has no first-hand knowledge . . . It is, therefore, the policy of the Museum to give its curators wide field experience, knowing well that this will result not only in better collections, but in more discriminating reports upon them.

LOST WORLDS: THE GUAYANAN TEPUIS

The big blank spaces in the map are all being filled in, and there's no room for romance anywhere.
(Sir Arthur Conan Doyle in *The Lost World*)

A region relevant to the growth of the Herpetology collections is "Pantepui," which comprises the total assemblage of sandstone table mountains that rise from the Guayanian shield of northeastern South America. These mountains are generally known as *tepui*s. Although an area of great biological interest, it remains poorly known. American Museum work in the region began several years after the founding of the original Department of Ichthyology and Herpetology. Herpetology benefited from receipt of specimens, but the Department was not directly involved in tepui expeditions until recent years (1978–1995), although Noble had intended to send a representative to the aborted 1931–1932 Pacaraima Expedition (see below).

The tepuis are popularly called "lost worlds" after Sir Arthur Conan Doyle's famous novel *The Lost World* (1912), which is widely thought to have been inspired by Cerro Roraima.

Conan Doyle was aware of various scientific research at the turn of the century, including the British exploration of Roraima in the late 1800s (see Lankester, 1900). A biographer (Higham, 1976: 234) noted that

In 1911, Conan Doyle had casts made of the previously discovered iguanodon footprints. Almost as though he were practicing psychometry, he was inspired by them to create perhaps his finest work in fiction, *The Lost World*, for which he consulted with the eminent zoologist Edwin Ray Lankester [see Lankester, 1900].

But there is another claim for the archetype of *The Lost World*—the Serra Ricardo Franco. This is an elongated, centrally erod-

ed table mountain straddling the border between western Mato Grosso (Brazil) and eastern Bolivia. The larger and western part of the massif lies entirely in Bolivia, where it is known as Serranía de Huanchaca (for geomorphology, see Litherland and Power, 1989). Col. P. H. Fawcett (1867–?1925), in a posthumously published manuscript, made the assertion that Serra Ricardo Franco/Serranía de Huanchaca was Doyle's *Lost World* (Fawcett, 1953: 122).

Colonel Fawcett was a talented albeit eccentric explorer who disappeared in northern Mato Grosso in 1925, before which he had written the following:

Above us towered the Ricardo Franco Hills, flat-topped and mysterious . . . Time and the foot of man had not touched those summits. They stood like a lost world, forested to their tops, and the imagination could picture . . . monsters from the dawn of man's existence . . . imprisoned and protected by unscalable cliffs. So thought Conan Doyle when later in London I spoke of those hills and showed photographs of them. He mentioned an idea for a novel on Central South America and asked for information, which I told him I should be glad to supply. The fruit of it was his *Lost World* in 1912, appearing as a serial in the *Strand Magazine*, and subsequently in the form of a book that achieved widespread popularity.

Conan Doyle (e.g., 1924) was more interested in the "overwhelming importance" of the occult than in discussing the ideas for his novels. However, he quite likely was impressed by Fawcett's mountain in Mato Grosso, as well as by the better known Cerro Roraima, about 2300 km almost due north. This seems suggested on the page of *The Lost World* where one of his characters exclaims (emphasis added),

There are just some narrow water-lanes along which folk travel, and outside that it is all darkness. Now, down here in the *Matto Grosso*—he swept his cigar over a part of the map—or up in this corner where three countries meet, nothin would surprise me.

Reference to the Matto [Mato] Grosso concerns Fawcett's mountain, whereas the part about three countries meeting refers to Cerro Roraima, which is situated on the three-way border between British Guiana (now Guyana), Venezuela, and Brazil.

Given that Doyle was aware of two "lost worlds," which of them are we to believe most strongly exerted its influence on him?

The geography of the novel points clearly to the northern one. Fawcett saw his lost world by traveling from England to Buenos Aires and up the Río Paraguay to the Brazilian port of Corumbá, and so on. Doyle's fictional crew, on the other hand, left England for Para (Belém) and then up the Amazon to Manaus (Manaus), from there northwestward up a great stream [the Río Negro] to a wide-mouth tributary [presumably the Río Branco], after which the itinerary "is carefully confused, so that in no way can it be taken as an actual guide to the country." But they certainly were headed in the direction of Cerro Roraima!

So much for fiction. Next following are summary statements for the 11 actual tepui expeditions involving the American Museum, plus one highly planned and advertised expedition that did *not* take place.

1912–1913 ATTEMPT ON CERRO DUIDA: This first American Museum tepui expedition was small and unsuccessful. It was the 1912–1913 attempt on Cerro Duida, supported through the office of Curator Frank M. Chapman, Department of Ornithology (account in Chapman, 1914). On December 17, 1912, Leo Miller and one assistant left Ciudad Bolívar (near mouth of the Río Orinoco) in route to San Fernando de Atabapo far upriver. By March 4, 1913, they had established a camp about 2 miles from the base of Cerro Duida when Miller's assistant became seriously ill owing to a combination of malaria and beriberi; the trip failed at this point and the mountain remained unexplored until 1928 (see below). No herpetological specimens were obtained to my knowledge.

Further work in the region seems not to have been attempted until a decade and a half later, when expeditionary fever was at a pitch and financing was relatively easy to come by. Then, G.H.H. Tate, Assistant Curator of South American Mammals, conducted back-to-back expeditions to Cerro Roraima and Cerro Duida.

1927–1928 LEE GARNETT DAY RORAIMA EXPEDITION OF THE AMERICAN MUSEUM OF NATURAL HISTORY (FIGS. 60–62): Like Conan Doyle's *Lost World* expedition, Tate's party reached Cerro Roraima by travelling north out of Brazil, via the Río Branco; they later exited east across British Guiana. This ex-



Fig. 60. Sixteen years after the Roosevelt–Rondon Expedition (see fig. 56), Cândido Mariano Rondon—now General Rondon—again assists an American Museum expedition in Brazil. *Left to right:* Geoffrey Tate, General Rondon, G.H.H. Tate, unidentified member of Rondon's party.

The Museum's Lee Garnett Day Expedition consisted of G.H.H. Tate (later a curator of mammals), his brother, and T. D. Carter. General Rondon was making a border survey and invited Tate's party to travel with him from Limo, Brazil, to Cerro Roraima (seen in background) on the border between Brazil, British Guiana, and Venezuela. Photograph by T. D. Carter at Paulo Camp, October 1927. AMNH Photographic Archives 5560.

pedition was important in sharpening Tate's expertise in tepui habitats; also, Tate's party spent more time than did previous expeditions in collecting on the summit of Cerro Roraima (November 17–29, 1927). The expedition was described by Tate (1928, 1930).

1928–1929 SIDNEY F. TYLER, JR. DUIDA EXPEDITION OF THE AMERICAN MUSEUM OF NATURAL HISTORY: This, the first successful expedition to Cerro Duida, has been the most influential of all tepui expeditions, since it made huge zoological and botanical collections and clearly demonstrated that the tepuis

did not share identical biotas. Under the leadership of G.H.H. Tate, the expedition started from Manáos, Brazil, proceeded up the Rio Negro, and then across the Casiquiare Canal to the Río Orinoco. This expedition, described by Tate and Hitchcock (1930), was accompanied by geographer Charles B. Hitchcock, who also accompanied a few of the later Phelps' ornithological expeditions.

"1931–1932" "THE PACARAIMA–VENEZUELAN EXPEDITION OF THE AMERICAN MUSEUM OF NATURAL HISTORY, THE AMERICAN GEOGRAPHIC SOCIETY, AND THE NEW YORK



Fig. 61. Summit Camp on the *Lost World* of Cerro Roraima during the 1927–1928 Lee Garnett Day Expedition of the American Museum of Natural History. Photograph taken in November 1927 by Expedition Leader G.H.H. Tate. AMNH Photographic Archives 5641.

BOTANICAL GARDEN”: This *would* have been an important expedition if it had ever taken place, which it did not despite a published article (Anthony et al., 1931)! It would have involved the first major use of airplanes for expeditionary work in this region, but apparently the necessary \$156,700²³³ could not be raised after the advent of the Great Depression. The article by Anthony et al. (1931) laid out an ambitious program that would have been extraordinarily worthwhile. It also would have been the first tepui expedition to field a herpetologist, since the Department’s “A.” [W.] G. Hassler was listed as an expected participant.

1937–1938 PHELPS VENEZUELAN EXPEDITION OF THE AMERICAN MUSEUM OF NATURAL HISTORY (FIG. 63): This was the first biological exploration of the recently discovered Auyantepui, which, next to Roraima, is now the best known tepui owing to its high waterfall (Angel Falls) and its accessibility to

tourists. The expedition was funded by W. H. Phelps of Caracas, under the leadership of G.H.H. Tate. It represented perhaps the first use of the airplane in a major natural history expedition in South America. For general accounts, see Tate (1938a, 1938b). Roze (1958) reported on the reptiles collected. See also the 1994 expedition to Auyantepui (below).

Following the 1937–1938 expedition, W. H. Phelps, Sr. and W. H. Phelps, Jr. independently conducted a long period of ornithological expeditions to the Venezuelan tepuis. This work was summarized by Mayr and Phelps (1967), who coined the useful term “Pantepui” as a biogeographical entity.

1978 GOVERNMENT OF VENEZUELA–AMERICAN MUSEUM OF NATURAL HISTORY EXPEDITION TO CERRO YAPACANA, UPPER ORINOCO: This expedition unknowingly ushered in the “modern” age of tepui exploration by American Museum parties. Although I had originally conceived it as a small expedition (John



Fig. 62. The "Great Central Swamp" on the summit of Cerro Roraima. Photographed in November 1927 by G.H.H. Tate. AMNH Photographic Archives 5695.

Daly and myself plus boatmen and packers), it was enlarged to include nine botanists and zoologists after difficulty in obtaining permits led to fruitful collaboration with, and logistical support from, CODESUR, then a body of Venezuela's Ministry of the Environment and Natural Resources. Dr. Otto Huber served as expedition leader and coordinated a subsequent, unpublished expedition report (Myers et al., 1978).

Our original objective was to look for a tiny red poison frog, *Dendrobates steyermarki* Rivero, which had been known on the basis of a single specimen collected by the botanist Julian Steyermark some years previous. This frog, later made type species of *Minyobates* (Myers, 1987), proved to be extraordinarily abundant on the upper slopes and summit, living mainly in large terrestrial bromeliads. A small general collection was made but has not yet been reported on, except for one new species of frog described by Heyer (1995).

1984–1985 VENEZUELAN–AMERICAN EXPEDITION TO CERRO DE LA NEBLINA, SOUTHERN VENEZUELA: The Mountain of the Mist—Cerro de la Neblina (or Cerro Jiménez fide K. Phelps, 1954)—is an enormous equatorial table mountain rising precipitously from lowland rain forest and swamp forest on the border between southern Venezuela and northwestern Brazil. With one peak on the massif at an elevation of 3014 m, it is the highest South American mountain lying outside the Andean cordilleras.

This was a highly publicized expedition distinguished mainly by the large number of participants and the size of its combined botanical and zoological collections. It was an international expedition sponsored by the Fundación para el Desarrollo de las Ciencias Físicas, Matemáticas y Naturales (FUDECI) and the Venezuelan government, with American Museum participation (Depts. Entomology, Herpetology, Ichthyology, Ornithology) made possible with support from the late W.



Fig. 63. One of the first uses of the airplane in a major South American expedition (1937–1938 Phelps Venezuelan Expedition of the American Museum of Natural History)—Lockheed plane on savanna near the base of Auyantepui in the Venezuelan Guayana. Indian porters are carrying supplies from plane to tent. Reproduced from the photograph published in *Natural History* (42: 114), September 1938.

H. Phelps, Jr. of Caracas, as well as from the National Science Foundation.²³⁴ Dr. Charles Brewer-Carías served as expedition leader (Brewer-Carías, 1988).

Cerro de la Neblina is herpetologically the best known of the tepuis, owing to the coordinated work by eight herpetologists and other scientists during several segments of the expedition. The several herpetological publications produced so far include McDiarmid and Paolillo (1988) and Zweifel (1986a). This effort was summarized by Myers et al. (1993: 2):

Three groups of herpetologists worked in highland camps on Neblina: Charles J. Cole, Roy W. McDiarmid, and Richard G. Zweifel collected February to March, 1984; Linda S. Ford and Charles W. Myers collected from late November to early December, 1984; and Rex Cocroft, R. W. McDiarmid, and Alfredo Paolillo O. worked on the final trip January to March, 1985. These three groups also collected extensively at the lowland base camp. Helicopter sup-

port was unavailable to a fourth group that included herpetologists (L. S. Ford, C. W. Myers, A. Paolillo O., Janis A. Roze); this party traveled by dugout from the Río Negro and the Canal Casiquiare, as far as the mouth of the Cañon Grande at the western base of Neblina, and worked only in the lowlands, during June, 1984.

1989 PHIPPS TAPIRAPECÓ EXPEDITION TO SOUTHERN VENEZUELA: The “Phipps Tapirapécó Expedition” comprised the invited contingent of nine American Museum scientists, who helped close out the FUDECI-sponsored 1988–1989 *Expedición a la Sierra de Tapirapecó*—a major multidisciplinary exploration of a wilderness in extreme southern Venezuela. American Museum participation (Depts. Entomology, Herpetology, Ichthyology, Ornithology) received principal support from the Phipps Foundation through Anne Sidamon-Eristoff, and supplemental support from Robert G. Goelet. The herpetology

team included Charles J. Cole, John W. Daly, Maureen A. Donnelly, C. W. Myers, and Carol R. Townsend. Dr. Eugenio de Bellard Pietri served as expedition leader (de Bellard Pietri, 1989, "1993" [1996]).

Technically speaking, this is not a tepui area (the eroded highlands are narrow, not mesalike), but a collection made on the granitic Cerro Tamacuari proved to have a herpetofauna reminiscent of middle-elevation forest on sandstone tepuis. Only one herpetological paper has appeared to date (Myers and Donnelly, 1997).

1990 EXPEDITION TO CERRO GUAQUINIMA, VENEZUELA: The expedition to this immense, low-lying tepui in eastern Venezuela was sponsored by FUDECI, with American Museum participation (Depts. Entomology, Herpetology, Ichthyology, Ornithology) assisted by support from Kathleen de Phelps of Caracas. Dr. Eugenio de Bellard Pietri served as the expedition leader. Donnelly and Myers (1991) published on the AMNH herpetological collection.

1993 EXPEDITION TO SERRA TEPEQUÉM, RORAIMA TERRITORY, NORTHERN BRAZIL: Serra Tepequém is a tepui outlier, an erosional remnant of the Roraima Formation rising out of the grasslands of northern Brazil. The expedition was organized by and comprised only of herpetologists: Celso Morato de Carvalho, W. Ronald Heyer, Paulo E. Vanzolini, and myself. Sponsored and funded by the Instituto Nacional de Pesquisas da Amazônia and the Museu de Zoologia (Universidade de São Paulo), the expedition had been conceived by Vanzolini and myself several years earlier when, in company with Carvalho, we had seen the classic tepui profile from a distance. It is, however, a stub of a tepui, largely eroded within the outer walls, and supports a primarily lowland fauna. A report has yet to be prepared.

1994 ROBERT G. GOELET AMERICAN MUSEUM—TERRAMAR EXPEDITION TO AUYANTEPUI: This expedition marked a return to Auyanteptui, the mountain which the Museum helped to make known shortly after the discovery of Angel Falls in 1937 (see above). American Museum Ornithology and Herpetology teams, led by Barrowclough and Myers, worked with Venezuelan colleagues in five helicopter camps established during a month-long (February) survey of the summit. The AMNH herpetology team included John W. Daly, Maureen A. Donnelly, and myself, with a young Venezuelan herpetologist, J. Celsa Señaris (Museo de Historia Natural La Salle, Caracas), joining us for 10 days.

The expedition was sponsored by the American Museum in collaboration with Fundación TERRAMAR and the Venezuelan National Park System. Señaris ("1993" [1995]) described a new species of frog obtained during the expedition, and Myers (1997) provided a preliminary assessment of the herpetofauna. Dr. Armando Michelangeli Ayala served as the expedition leader for this and for the following expedition.

1995 ROBERT G. GOELET AMERICAN MUSEUM—TERRAMAR EXPEDITION TO THE NORTH-WESTERN TEPUIS (FIG. 64): This was one of the most successful tepui expeditions in terms of efficiency, with five wilderness camps established on three tepuis in a 30-day period. The highest of these was Cerro Yaví, with a small summit area about 2100 m above sea level; the other tepuis, Yutajé and Guanay, had different environments with little faunal overlap. Organization of the expedition was similar to the one preceding, with logistics provided by Fundación TERRAMAR. The herpetological team included Daly, Donnelly, and myself. Reports have been prepared for Yaví and Yutajé (Myers and Donnelly, 1996, ms).

END OF AN ERA

The number of new expeditions peaked in the 1930s, not in the 1920s as might be expected (see tallies under An Overview of American Museum Expeditionary History). Additionally, more expeditions were started

in the second half of the 1930s than in the first half (57 starts in 1930–34, 84 in 1935–39). This seems at first surprising when it is considered that, owing to the Great Depression, the Museum essentially started halting



Fig. 64. Sit it down easy! The helicopter has changed the nature of *tepuí* exploration, but finding a safe place to land is not always a simple matter. Photograph by C. W. Myers at Camp 1 on Cerro Guanay during the 1995 Robert G. Goelet American Museum-Terramar Expedition to the Northwestern Tepuis.

its expeditions by 1932, to the dismay of a segment of the reading public gotten used to thrilling over the discovery of dinosaur eggs in the Gobi Desert or worrying over Stefánsson's disappearance in the Arctic. On January 5, 1932, at least five New York newspapers²³⁵ carried announcements that the Museum was halting exploration. It was the start of Henry Fairfield Osborn's 24th (and last) year as president and his 40th year as curator. As reported in the *New York Times*,

The difficulty of obtaining funds for its sixtieth anniversary endowment drive, begun in 1929, has compelled the American Museum of Natural History to discontinue all exploration and field research work throughout 1932, it was said last night by Dr. Henry Fairfield Osborn in his report as president, presented before the sixty-third annual meeting of the trustees . . .

On the day following, the *New York Herald Tribune* published an editorial titled "Discovery" that began and ended as follows:

If the pressures of economy compel the American Museum of Natural History to call in its far-flung expeditions, there is, of course, no help for it. Yet it seems a pity, for of the innumerable idealistic and educational objects which people find to spend their wealth upon, few are more worth while, to our way of thinking, than these efforts at modern exploration and discovery.

. . . The Natural History Museum's announcement shows again that . . . "for any scientific explorer it is not the tiger in the jungle, the polar bear on the pack ice or the snake in the undergrowth which are wild beasts to worry about, but only the wolf at the door." One may hope that he will not assail Dr. Osborn's door too closely or for too long a period.

In truth, however, the days of the Great Expeditions had all but ended, although the venerable and separately financed Whitney

South Sea Expedition was to decline into a series of smaller expeditions that continued until about 1940. With Osborn passing from the presidency and the wolf at the door, new administrations failed to rekindle the spark that had glowed most brightly during the 1920s.

What, then, of the numerous expeditions of the 1930s? The previous decade had set attitudes and established a momentum. Not everybody lost their wealth during the Depression, and therefore *independently* financed expeditions continued under the Museum's auspices. Museum Trustee Childs Frick continued his sponsorship of explorations for fossil vertebrates, Trustee Arthur S. Vernay collected large game and other animals in Africa, Malaysia, and Burma, and Richard Archbold was just starting a series of vertebrate-collecting expeditions to New Guinea that were to span three decades. And the Museum's curators continued to find their ways to distant field sites: Barnum Brown to the dinosaur beds, Junius Bird to Tierra del Fuego, James P. Chapin back to Africa, Margaret Mead to New Guinea, Robert Cushman Murphy to Oceania, Harry L. Shapiro to Tahiti, George Gaylord Simpson to Patagonia, and so on.

But finances had improved little by the beginning of the 1940s, and World War II dealt the crushing blow to the Museum's great expeditionary period that, at the outside, lasted from about 1910 to 1940. Nonetheless, American Museum staff have been involved in hundreds of field trips since 1950, with a high of about 100 trips during the decade of the 1950s. Many of these were quite properly called expeditions, and some have been interdepartmental and interdisciplinary in nature, including, for example, the 1956 *Puritan*-AMNH Expedition to Western Mexico, the 1953-1964 fourth to seventh Archbold expeditions to New Guinea, and the 1984-1995 expeditions to the Venezuelan tepuis.

In the main, however, recent decades have seen mostly simply organized field trips by individual scientists pursuing individual projects, often in remarkably remote locations. In the case of the zoological systematists, virtually all are eager for new collections, although there are some who will not join a large-scale expedition even when invited.

Their reluctance probably is due most often to a recognition that their own research programs would not sufficiently benefit by contributing their time for someone else's scheduling. There is nothing new in this understandable attitude: G. K. Noble did not completely abandon fieldwork for the laboratory even at the height of his career—he worked on specific field projects, for example, in the Ozarks in 1928 and in Cuba in 1937—but he recommended Emmett Reid Dunn as herpetologist to accompany his friend and patron Douglas Burden on the latter's well-publicized expedition in 1926 to the Island of Komodo (see under *Some Early Department Fieldwork*). Burden credited Noble with rousing his interest in Komodo, but Noble was not one to suppress his own ongoing research for weeks or month's of travel at someone else's request. Parallels also can be found in other AMNH curators of Noble's time, yet others were eager then (as now), and there has never been difficulty in finding qualified men and women who are ready for an expedition experience. Murphy (1930: 467) noted that,

So firmly is the Museum associated in the popular mind with exploration that . . . fully a thousand letters, including several score from women, swamped the office of the leader" after one newspaper announcement of an expedition.²³⁶

So, with this history and tradition, why was there such a weak revival of expeditionary spirit at the American Museum following World War II? There is no single answer to that question and any answer needs qualification.

Certainly the money ran out, but loss of financing was in my view not nearly so important as loss of Henry Fairfield Osborn at the helm. With Osborn gone, the Museum simply lost and never regained the pervasiveness of the expeditionary spirit that his administration had fostered. There are those who have dwelt on Osborn's faults, his ego, and his personal agendas,²³⁷ but it was his global enthusiasm in large part that made possible an extraordinary period in the Museum's history. He was a president who could set international wheels moving *and* raise the financing for an expedition to the Belgian Congo that lasted from 1909 to

1915, and he could allow himself to listen to a man who wanted to work in Central Asia—a man named Andrews who had started in the Museum by scrubbing floors (Hellman, 1968: 173), and who ultimately led the most ambitious land expeditions ever to leave the United States. Arctic exploration? Fine, that was exciting too! And Osborn's influence on Herpetology in the Museum was considerable, as the following examples suffice to show.

Osborn accepted advice and acted decisively on matters affecting the fledgling Herpetology division. He agreed with Bashford Dean to split Ichthyology and Herpetology and to establish a new department under the leadership of Mary Dickerson. Osborn authorized Dickerson's continued spending in a tight field situation, when her "boys" in Nicaragua got in beyond their experience and pleaded to stay longer in order to "make good." And Osborn took a bold and expensive step in authorizing the Department of Herpetology to expand into exciting areas then described as "experimental biology."

Osborn stories are waning in the Museum, but 30 years ago an older curator told me the story (that someone had told *him*) that Osborn once admonished a secretary "never to blot a Great Man's signature"—his signature, I suppose. I do not know if that particular anecdote is in print, but nowadays Osborn stories mainly derive from the growing body of writings about him.²³⁸

Times were bound to change with or without Osborn, however. He was not the last President who could be enthusiastic about expeditions to places near or far. In recent years, for example, former president (the eighth) Robert G. Goelet believed that natural history expeditions were something that the Museum should be doing, and he committed his own funds to that end. Well before Goelet's presidency, though, a different atmosphere had come over the place. The curators mostly seemed to be doing fine *without* the large expeditions of days past, and they were not merely living off the fruits of past labor, for the collections were still growing to such an extent that new construction was needed to house them.

There probably are some who will suspect that biological expeditions had become irrel-

evant for reasons that are related to the expansion and modernization of 20th century biology (e.g., see essays in Rainger et al., 1988, and Benson et al., 1991):

In the years between 1920 and 1950 biology became "big science" and underwent profound changes occurring in scope, methodology, and objectives. It became more closely integrated with physics, chemistry, and the social sciences and thus incorporated new methods, techniques, and instrumentation. (Rainger, 1991b: 1)

By and large, however, systematic biology has increasingly embraced the new technologies to such an extent that scanning electron microscopes and molecular laboratories have become (despite nearly prohibitive costs) essential features of major natural history museums. Indeed, with Osborn's support, Noble brought new instrumentation and methodology into the American Museum in the 1920s, as indicated by the addition of "Experimental Biology" to the name of the Department of Herpetology. Noble was perhaps the first herpetologist to entertain the notion that biochemical systematics might be useful (Boyd and Noble, 1933), and, had he lived longer, he would have seen nothing amiss in having molecular laboratories in the Museum. However, donning a white laboratory coat did not cause Noble to lose interest in taxonomy or in expeditionary work, both of which he always strongly supported. Expeditions not only provided him the preserved specimens essential for systematic knowledge, but also *living* creatures, which provided the stuff of his experimental approach and potentially deeper understandings than were otherwise possible.

It was not new paradigms but probably a matter of simple efficiency that would have spelled the end of the Museum's great expeditionary period, regardless of other factors involved—efficiency in the name of the airplane and the automobile, as well as their unfortunate correlate, the contraction and disappearance of wilderness. I stated earlier that modern air travel has given individual scientists a new freedom to conduct their research with efficiency and dispatch. One need no longer spend weeks in ocean travel to reach some port from which a months-long expedition can be launched, before another sea voyage home. A simple flight with

a stop at a car rental agency may get needed results in a fraction of the time; that is, if one can get through the permit bureaucracy. Unfortunately for those who would study biological diversity before it disappears, not all aspects of fieldwork have become more efficient in recent years. Nowadays it seems that "No jungle trail is more labyrinthine than those leading through government ministries to the necessary permits and signed agreements in this new age of environmental concern."²³⁹

The Era of Great Expeditions ended by

1940, finished not by any one thing but by the consequences of the Great Depression and passing of the Osborn regime, and by the coming age of the airplane and automotive transport. Logistically complicated expeditions have been largely replaced by field trips that are simpler to arrange, quicker to accomplish, and less expensive. Expeditions have not entirely disappeared from the scene—they are still needed and still contribute significantly to Museum programs and to Science generally. But today's expeditions also are nostalgic reminders of another time, to which this history is a kind of homage.

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Archival research by Grace M. Tilger has been invaluable during the preparation of this report, and I am exceedingly grateful for her help over the years. Many members of the American Museum Library staff have been helpful for a very long time, but I especially want to single out Special Collections Librarians Barbara Mathe and Andrea LaSala for their guidance through the intricacies of the American Museum's Central Archives and Photographic Archives. As noted by Kennedy (1968: 262),

Few other scientific institutions have kept such a voluminous record of their past . . . Only the Library of Congress manuscript collection contains as much unpublished material on the history of American anthropology and zoology.

The Department of Herpetology Archives, a collection apart from the Central Archives, were organized at my direction during 1983–1992, from decades of accumulated curatorial correspondence, departmental budget justifications, Museum memoranda, and other items that my predecessors fortunately never bothered to throw out. This resource has already contributed to several studies in the history of science (see Mitman, 1992, 1993, 1999; Mitman and Burkhardt, 1991; Myers and Zweifel, 1992; Ogilvie, 1991; Winston, 1999). The departmental archival files provide rare insight on American herpetology and its practitioners during the 20th century, and the present paper would have been immeasurably different without awareness of the correspondence of Dickerson,

Noble, their contemporaries, and their successors. In quoting from this material, I have "silently corrected" most of the obvious errors in typing or spelling.

For the years up to 1942, I have also made considerable use of the official published annual reports of the American Museum of Natural History (herein cited as "AMNH Annual Report for [year]"). From 1909 to about 1941, the typescript annual reports submitted by the Department *usually* were more or less the same as the published reports, but the draft reports and associated materials are occasionally more informative and I sometimes draw on those instead of the published versions.

Starting about 1942, the scientific departments fortunately were required to prepare more extensive archival reports in addition to copy for the published reports. After 1941, therefore, I almost exclusively cite *only* the unpublished archival reports for Herpetology, inasmuch as the published reports from that time on are much less useful.

The importance attached to annual reporting has varied considerably among administrations, as have dates of publication. The published reports were not issued on any stated date prior to 1907; the *Reports* for calendar years 1908 and 1909 were issued on May 1 of the year following; and *Reports* for 1910–1916 were variably issued in early February of the year following, whereas those for 1917–1945 reverted to a May 1 date of the following year. Beginning in

1946, the American Museum shifted from calendar-year reporting to a fiscal year, starting with July 1 and ending on June 30 of the year following, with published reports appearing several months later in the fall. However, this scheduling broke down in the 1990s, with delayed and irregular publication dates. No published report was issued for fiscal year 1994–95, but, in an attempt to catch up, the Museum's first biennial report later covered that year as well as 1995–96. An annual report again appeared for 1996–97, although scientific coverage was reduced and sometimes inaccurate (at least for Herpetology).

I have assembled and had bound a set of published and archival reports for Herpetology, which are housed in the Dickerson Library, Department of Herpetology. For practicality and continuity, these reports should be cited as "Dept. Herpetology [Published or Archival] Report for [year]," regardless of what the official department name was in a given year.

Where annual reports were ambiguous or lacking in detail, minutes of meetings of the Board of Trustees and of the Council (or Senate [since 1990]) of the Scientific Staff were consulted, although administrative and department correspondence files often were more revealing when seeking reasons for official actions. The Museum's old payroll records proved to be a valuable resource for documenting dates of appointment and lengths of service. I am grateful to former Payroll Manager Robert Applebaum for access to the records of past employees.

It has been more than two decades since I started casual compilation of a list of AMNH expeditions significant to the growth of the herpetological collections. I owe much to Curator Emeritus Richard Zweifel for discussions on this list and for sharing his extensive knowledge of the relevant literature. Additionally, earlier American Museum librarians compiled a potentially comprehensive AMNH Expedition File, in which expeditions are individually numbered in a more-or-less chronological sequence and partially referenced to annual reports and *American Museum Journal* articles. This list is most useful for the early years (when expeditions were regularly mentioned in news

notes on the back pages of *The American Museum Journal* and its successor, *Natural History*), but it is still especially incomplete and unreliable for the decades following World War II (when the main source became fragmentary accounts of curatorial fieldwork in the Museum's annual reports). I have added the Expedition File numbers (where available) to the expedition list published herein. Because it is uncertain whether these numbers will be stable, I have placed a 1991 xerographic copy of the Expedition File in the Department of Herpetology Archives. The rough tally of expeditions by decade (1887–1949) on page 117 is based on this copy, with the following corrections: I have deleted the "1931 Pacaraima–Venezuela Expedition" (a planned expedition which never took place) and have added the overlooked 1911 Albatross Expedition and the 1947 David Rockefeller Mexican Expedition of the American Museum. However, some other early expeditions not in the Museum's Expedition File (indicated in the present list by "No AMNH number assignment") are not reflected in the tally, which therefore slightly understates the actual number of expeditions.

Mary Dickerson's niece, Mrs. Margaret D. Hopkins, of Delaware, Ohio, generously contributed the second known photograph of Miss Dickerson as well as inscribed copies of her two books, which now reside in the Dickerson Library, Department of Herpetology.

Ms. Dorothy Blanchard provided copies of handwritten letters by G. K. Noble to Frank N. Blanchard, and she searched her father's 1930 diary for relevant information concerning Assistant Curator C. M. Burt.

Mrs. Jefferson D. Parker kindly authorized Tilger's access to Thomas Barbour's (her father's) correspondence in the Pusey Library at Harvard University. I thank University Archivist Harley P. Holden for permission to publish from these materials, which are identified in the citations as "Courtesy of the Harvard University Archives."

For other help at Harvard, I am especially appreciative to Dr. John Cadle, Curator, and Ms. Mary Sears, Reference Librarian, in the Museum of Comparative Zoology.

From the Field Museum of Natural History, Mr. Alan Resetar provided several crit-

ical documents pertaining to Karl P. Schmidt, and Dr. Robert F. Inger shared pertinent recollections based on his long acquaintance with Schmidt. Dr. Donald G. Broadley, Biodiversity Foundation for Africa, confirmed my assumption that Schmidt's early manuscript on the Rhodesian herpetofauna was never published. Dr. George R. Zug provided needed bits of information from the National Museum of Natural History, Smithsonian Institution.

In the American Museum, Curator Emerita Ethel Tobach kindly donated photographs and documents from Noble's era. And I am grateful to Denis Finnin and his staff in the Photographic Division—Jackie Beckett, Craig Cheseck, and Justine Heilner. Each of them contributed to production of new photographs or to the processing of old and precious negatives.

For reading and critically commenting repeatedly on the manuscript in its entirety, and for much other help, I have immeasurable debts of gratitude to Dr. Richard G. Zweifel and Ms. Grace M. Tilger. I also am deeply grateful to several colleagues who have special knowledge about the historical course of North American herpetology and who took time from busy schedules to review the manuscript: Dr. Kraig Adler, Section of Neurobiology & Behavior, Cornell University; Dr. John E. Cadle, Museum of Comparative Zoology, Harvard University; Dr. William E. Duellman, Museum of Natural History, University of Kansas; and Dr. Jay M. Savage, Department of Biology, University of Miami.

Former American Museum president Robert G. Goelet offered opinions and encouragement

that meant more than he realized. My wife, Joan, read all the narrative parts of the manuscript for clarity. My predecessor, the late Charles M. Bogert, commented from retirement on a brief, first version of this study over a decade ago (letter of April 15, 1987). Several colleagues at the American Museum have kindly read sections in their fields of expertise: Ms. Mary K. LeCroy (Dept. Ornithology) for *The New Guinea Expeditions*, and Mr. Eugene Bergmann and Mr. Stephen Quinn (Dept. Exhibition and Graphics) for *A Century of Exhibition, 1870s–1978*.

I have been blessed to work in a department that has been staffed with exceptional people for the 90 years of its existence. There have been low times to be sure, but inevitably these were swamped by rising tides of dedication and congeniality. One cannot clearly describe one's gratitude to those who came before and made the present possible—there is only an indefinable feeling of kinship. More easily comprehended is my appreciation to certain recent and present members of the Herpetology staff, who have in various ways contributed directly to this study and who have done much to relieve the burden of my own routine: Margaret G. Arnold, Charles J. Cole, David Dickey, George W. Foley, Linda S. Ford, Darrel Frost, Michael W. Klemens, Irene Palser, Margaret S. Shaw, Grace M. Tilger, Carol R. Townsend, Thomas Trombone, and Richard G. Zweifel.

The fragment of verse ending the Prologue is out of Rudyard Kipling's *The Jungle Books*. Kipling would not have minded being used in the present context, in which the cadence of his lines is haunting.

APPENDIX 1: NOTES ON DEPARTMENTAL BIBLIOGRAPHIC PROJECTS

Despite the tremendous diversity of curatorial interests and research throughout most of this century, two common threads have run through every past departmental administration—the acquisition of collections, and the collection, classification, and use of herpetological literature. The first American Museum herpetologists were fortunate in having access to a first-rate natural history library, but every new collection and project required a scrambling to assemble literature. Schmidt and Noble, for example, had to find and master the African literature in short order before they could work up the large collections that poured in from the 1909–1915 Congo Ex-

pedition, and the same held true for Pope on China, as well as for others.

Following is a selection of statements over time that show the preoccupation with building a departmental reference library (termed the “Dickerson Library” by Noble) and subject index. At least by 1915, Dickerson had put to this task her first two assistants, Stella R. Clemence and Arline Field:

[Miss Field and myself] did find opportunity to incorporate into the department all the separates which the Museum library possessed on the subject of herpetology—the Library being willing to let us have

them at this particular time. These have been recorded in the department's catalog of herpetological literature, on subject, author and locality cards, and make a fine nucleus for a working library in herpetology. Also the reference catalogue of literature has been brought up to 1914. (Letter, Clemence to Dickerson, October 31, 1915)

The above is of interest in showing that, almost from the start, the literature was being indexed by author and subject, including geography. Furthermore, members of Dickerson's "triumvirate" were soon collaborating on a grand scheme:

. . . the plan for a general Bibliography of Herpetology, in conjunction with Camp and Noble [has been] adopted; the outline for this larger work has been prepared (chiefly by Mr. Camp) and typewritten. (Report, Schmidt to Dickerson, [April 30, 1917])

And Dickerson was writing around, making certain that current literature was being acquired:

Work has been continued on the bibliography catalogue. In this connection the department library has accessioned some 300 additional separates, gifts of the herpetology departments in the various museums of the world. (AMNH Annual Report for 1916)

In the archival draft of Dickerson's Annual Report for 1918, we learn that, in exchange for pamphlet binding, she had the incoming separates recorded as library property "to be held within our Department," thus explaining the AMNH Library bookplates that are affixed to many pamphlets in the Department's reprint files.

Soon, various special bibliographies were being brought together, with evident stimulation from an active program in Ichthyology:

Much bibliographic work has been carried on in connection with research, forming records of permanent value to the department and to herpetology. The bibliographic work has been standardized in accordance with a system compiled from previous researches, including that recently carried out by the department of fishes of the Museum, and it will be brought together from the permanent card indexes for publication in the future by Messrs. Charles L. Camp, George [sic] K. Noble, and Karl P. Schmidt. The Congo work has covered the cataloguing of more than 890 titles on African herpetology, 2,500 cards; that on the American Southwest includes about 270 titles, 4,500 cards; work on Asian herpetology has necessitated the cataloguing of 300 titles, 900 index cards; and miscellaneous work, 500 titles, 600 index cards. Mr. Noble brings to this work a contribution in neotropical bibliography as follows: 382 titles, with 514 cards of new species of amphibians, 452 cards of new species of reptiles (post-Boulenger). Mr. Camp contributes on North American herpetology and morphological papers, about 3,000 titles, 900 index cards. (AMNH Annual Report for 1917)

With Dickerson gone by 1921, Noble was in

charge of a new Department and could have backed off from her seeming obsession on building bibliographies as well as collections. He chose to continue Dickerson's ways:

Little mention has been made in former [meaning *his*] reports of the Department's Bibliography of Reptiles and Amphibians. Various department members have rapidly advanced this very important work during the past five years. Miss A. L. Brown and Miss E. E. Nelson gave it their especial attention this year. Certain sections of the Bibliography, especially those on the Amphibia, are nearly complete and have afforded much satisfaction to the several visiting scientists who have consulted them. Undoubtedly, this is the most complete bibliography in America dealing with the structure, biology and systematics of the Amphibia. It is hoped that the reptile sections will soon be brought up to date. (AMNH Annual Report for 1923)

If anything, Noble intensified the Department's efforts because his own research interests were growing rapidly, and no aspect of biology seemed to lack interest. By 1928, Noble had another assistant, Gertrude Evans, working mainly on the amphibian literature. Four months after starting, Miss Evans was asked (probably for reasons of the annual report) for a statement of her activities:

. . . my work has been chiefly bibliographical [including] care of the card catalogue for [Dr. Noble's] amphibian bibliography which is being added to weekly by cataloguing all references to amphibians which occur in current scientific periodicals. This entails a weekly scrutiny of . . . all periodicals received at the Museum library.

The larger part of the work has been reading and taking notes on special references sorted from this catalogue on such subjects as "The Amphibian Sense Organs," "Digestive System," "Habits." These articles are frequently in German, some in English, and a few in French. (Letter, Evans to Miss Anne A. Vaughan, Dr. Noble's office, December 31, 1928)

The basic library work performed by Miss Evans above presaged Noble's magnum opus, *The Biology of the Amphibia* (1931c), in which he was "especially appreciative of the aid given throughout the course of the work by my research assistant, Miss Gertrude Evans," with whom he also coauthored a paper on salamander life history (see Noble, 1932c in appendix 3).

Like Dickerson before him, Noble was determined that the Department be recognized as a major research center, for which good literature resources were a prerequisite:

The Department also maintains extensive card catalogues of the literature dealing with the biology and systematics of reptiles and amphibians. The collections and these catalogues make the Department one of the chief centers for herpetological research in the United States. (AMNH Annual Report for 1929)

Help in the Department was later hard to come by, although in 1931 Assistant Curator Pope mentioned having "the help of the unemployed" (a puzzling reference since this predates the Works Progress Administration, or WPA) in carding some 4000 titles (from Pope's letter to Douglas Burden, April 9, 1931). No Curator (Chair) of Herpetology was more strapped for assistance than C. M. Bogert in the 1940s, but he also managed to keep the bibliographic project alive:

The primary purpose of indexing collections and literature, the careful arrangement of collections, and of the library facilities is to further the progress of research. Furthermore, modern educational exhibits must be based on this research and on indexed information . . . the almost unique opportunities provided by the Department of Herpetology at the American Museum. (Letter, Bogert to Acting Director Wayne M. Faunce, November 21, 1941)

Under Bogert, one of Assistant Curator Zweifel's first tasks was the reorganization of the subject categories, and, later, *his* assistant curators (Cole and Myers) took their turn at scanning and coding new literature one year when the Department was devoid of scientific assistants. Myers and Zweifel (1993: 139) later observed that:

Bogert . . . devoted himself and departmental resources to keeping up the department's Bibliography of Herpetology, an index to the literature that had been developed through the efforts of earlier curators and assistants, starting with Mary Dickerson and continuing through K. P. Schmidt, C. L. Camp, C. H. Pope, G. K. Noble, and on to the present. In the early 1940s, when it would have been politically and economically expedient to terminate this project, he defended it to the administration as essential to the progress of herpetological research and exhibition at the American Museum. Indeed, after Bogert's retirement, the department's literature files were crucial during the 7-year development of a new *Hall of the Biology of Reptiles and Amphibians* (which he had helped plan years earlier). An enormous amount of literature research and other work for this permanent hall had to be done in addition to the basic research and other responsibilities mandated of curators; remembering those years, we greatly appreciate Chuck's earlier stubbornness that the bibliographic files be maintained.

THE HISS PROJECT (1968–1974): In the years 1968 through 1972, former Research Associate Herndon G. Dowling sought and received support from the National Science Foundation (NSF GN-707) for a project titled "The Genera of Reptiles and Amphibians: A Study to Consolidate Information," or (as preferred by the NSF) "Bibliographic Service in Herpetology." Dowling's work was based at the Museum in order to use the facilities of the main library and that of the Department, and he was initially encouraged by Di-

rector James A. Oliver and Herpetology Chairman C. M. Bogert (material on Dowling's project is filed in the Dept. Herpetology Archives, R. G. Zweifel Collection, Dowling folders). The original objectives were stated as follows:

It is proposed that a six-year study be made which will provide: 1) an easily-accessible punch-card bibliography and index to the world literature on amphibians and reptiles, and 2) a four-volume systematic publication, three volumes on the taxonomy and relationships, physical attributes, geographic distribution, and habits of these animals, with a fourth volume of bibliography.

This ambitious goal would have involved processing "about 60,000 literature citations" on punch cards and writing "approximately 1200 generic accounts." However, reality in the form of budgetary constraints and NSF insistence that Museum Bibliographic Services (there was a parallel grant in Ichthyology) be made into "viable, self-supporting operation[s]" played a part in Dowling's channeling his efforts into what became "Herpetological Information Search Systems" (HISS).

Dowling's operation provided alphabetized quarterly lists of "Current Herpetological Titles" to the journal *Herpetological Review*, starting with the second number of that journal (April 1968) and continuing for some 20 issues until late 1972. (Thereafter, "Current Literature" was carried on independently by volunteers for the journal [see *Herp. Rev.* 5(2): 50], but eventually this too faltered and died.) Other publications provided by HISS included some specialized bibliographies (with retrospective titles from the preexisting Dept. Herpetology subject cards) and a 1974 *Yearbook of Herpetology*. By the end of NSF support, the HISS operation had grown too expensive for continued support from sponsoring societies (Society for the Study of Amphibians and Reptiles; Herpetologists' League), resulting in bitter correspondence between Dowling and society officers.

There also were difficulties in meeting schedules and in satisfying subscribers. In the final instance, one very useful work was advertised in various places with a 1974 publication date but did not actually appear until December 1978 (Dowling and Duellman, "1974–1978" [1978]; bibliographic note in Myers, 1986: 12). After termination of NSF funding at the end of 1972, the project dragged on for a while with some society and reserve funds and limited Museum support. Full-time salaried employment of all HISS personnel was terminated in early June 1973, except that Bibliographic Associate Irene Palser was extended full-time and then part-time (to May 1975)

in order to help the Museum's financial offices clear up subscription problems. The Museum officially terminated all facility support in the fall of 1974, although the operation was not completely moved off premises until the summer of 1975.

In May 1975, Irene Palser moved into permanent Museum employment in other departments and eventually left the Museum in October 1987. She came back to Herpetology in 1992, first as Administrative Secretary and then Assistant to the Chairman. One of her principal responsibilities was to maintain the Dickerson Library and bibliographic files.

COMPUTERIZATION OF THE DEPARTMENTAL PROJECT: In 1987, an outside review committee commented on the Department of Herpetology Bibliographic Project:

The herpetological literature project is an under-utilized national resource. It requires considerable time to keep it current but presently is not utilized by herpetologists generally even though it is much more complete than the *Zoological Record* . . . The project needs to be reviewed to assess its national importance, to consider the possibility of changing it to a computerized system, to review possibilities to make it partially self-sustaining and to evaluate whether it is best curtailed or terminated.²⁴⁰

Two of those suggestions were implemented: (1) starting in 1992, all new citations were entered in an electronic database (dms4Cite); and (2) the

subject categories were periodically cut back and were drastically curtailed starting in early 1998. Unfortunately for some future curator or other user, the coding no longer is as *broadly* representative of amphibian and reptilian biology as formerly, but a necessary attempt had to be made to maintain basic services while decreasing the amount of staff time devoted to the project. Rather than comprehensive coverage, the main objectives of library scanning of new literature were changed especially to maintain the ability to retrieve citations relevant to identification and survey work (as necessary for collection routine and new field-work), and to support current projects of the curators (e.g., keeping Darrel Frost's *Amphibian Species of the World* up-to-date).

On-line computer searches in theory should make obsolete the maintenance of this elaborate bibliography, and some progress is being made (e.g., with *Zoological Record*). As of 1999, however, most of the literature subject-carded in Herpetology over a period of some 80 years was not in fact in any unified searchable database, and the resource therefore remains extraordinarily valuable. It continues to permit rapid response to public queries, furnishes potential support for new exhibition work, provides rapid assessment of literature for faunal surveys and working up new collections, and saves researchers an enormous amount of time when contemplating new research.

APPENDIX 2: BIBLIOGRAPHY OF MARY CYNTHIA DICKERSON (1866–1923)

The present *partial* bibliography was prepared with the aid of Grace M. Tilger, who helped ferret out references. No one to our knowledge has seriously tried to gather all of Mary Dickerson's published writings, which, with the passing of her contemporaries, have mostly been forgotten. Her annual reports for two American Museum departments are historically relevant and are listed at the end of this bibliography.

In reading through the titles gathered here, one is struck by the diversity of Dickerson's subject matter, from forestry to herpetology and ichthyology, museum exhibition, and general natural history and nature writing. The museum-related articles were prepared during her decade-long editorship of *The American Museum Journal/Natural History* (name change in 1919). Articles listed below either bear her name after the title of the article, or include her initials or "the editor" at the end of the piece. However, Dickerson's authorship can be reasonably attributed to more than 140 articles, notes, editorials, and introductions to articles by other writers that were published in

The American Museum Journal and *Natural History* during 1910–1920. Only a sampling is given here, with anonymous notes and such being excluded.

A letter from President Osborn further hints at the considerable amount of writing and rewriting that she did under editorial anonymity:

Dear Miss Dickerson:

I have just succeeded in reading your beautiful article on "Sequoia," and I can only consent to putting my signature to it, if you place a footnote after my name, or at the bottom of the page, saying that "This article was prepared by Miss Mary Cynthia Dickerson at the request of the author. It is entirely from the hand of Miss Dickerson, but at her request, President Osborn gives his signature to show his warm approval both of its contents and of its sentiments."²⁴¹

The *Sequoia* article, however, must have been in press at the time of Osborn's letter (dated January 20, 1920), appearing without acknowledgement of Dickerson's authorship in the December 1919 issue of *Natural History* (Osborn, "1919" [1920]). It was a well-researched, well-written conserva-

tion article supportive of the *Save the Redwoods League* (of which Osborn was one of 21 council members).

Dickerson's last three articles (1920a, 1920b, 1920c) listed below were signed "The Editor," in *Natural History* volume 20, number 4—the last issue in which her name appeared as editor. The last of these diverse pieces proclaimed the value of long-term research in a specialized aspect of economic forestry, reminding us that, in addition to her other roles, Dickerson was the Museum's first Curator of Woods and Forestry (see Moore, 1923).

1901. Moths and butterflies. Boston: Ginn & Co., Publ., Athenaeum Press, frontisp., xviii + 344 pp.
1906. The frog book. North American toads and frogs with a study of the habits and life histories of those of the northeastern states. New York: Doubleday, Page, frontisp. + xvii + 253 pp. + 96 pls. [Several printings 1906–1937. Reprinted 1969, with preface by J. D. Anderson. New York: Dover.]
1907. The pageant of nature. Country life in America 11(3): 286–290, 356, 358, 360 (*I. Woods life in January*); 11(4): 421–424, 440 (*II. In February woodlands*); 11(6): 657–660 (*III. The watercourses of April*); 12(1): 64–67, 92, 94 (*IV. May mornings*); 12(2): 183–186, 228, 230 (*V. Bird life in June*); 12(3): 317–320 (*VI. Young fur-coats*); 12(4): 434–437, 472, 474 (*VII. On sandy beaches*); 12(5): 543–546 (*VIII. September musicians*); 13(1): 57–60; 13(1): 57–60 (*IX. When winter comes*); 13(2): 189–193 (*X. The hungry days of December*).
- 1908a. Notes on a collection of fishes from the Gulf of Mexico at Vera Cruz and Tampico. Proc. U. S. Natl. Mus. 34(1592): 11–22 (2nd author, with David Starr Jordan).
- 1908b. Description of a new species of half-beak [(*Hemiramphus mioporus*)] from Nagasaki, Japan. Ibid. 34(1602): 111–112 (2nd author, with David Starr Jordan).
- 1908c. On a collection of fishes from Fiji, with notes on certain Hawaiian fishes. Ibid. 34(1625): 603–617 (2nd author, with David Starr Jordan).
- 1908d. Notes from a winter diary. New Engl. Mag. 39(4): 434–436.
- 1909a. [Same title.] Ibid. 39(5): 534–537.
- 1909b. [Same title.] Ibid. 39(6): 704–707.
- 1909c. [Same title.] Ibid. 40(1): 26–29.
- 1909d. Chickadee all the year round. Bird-Lore 11(2): 59–63.
- 1910a. Trees and forestry. An elementary treatment of the subject based on the Jesup Collection of North American woods in the American Museum of Natural History. AMNH Guide Leaflet 32: 104 pp.
- 1910b. In the heart of Africa. The first published account of the Museum's Congo Expedition. Photographs by Herbert Lang. Am. Mus. J. 10(6): 147–170. [Reprinted in two parts (some illus. omitted and order changed) in Sci. Am. Supplements 1821 (Nov. 26, 1910) and 1822 (Dec. 3, 1910).]
- 1910c. Herculean task in museum exhibition. Foreword regarding the ceremonial canoe scene in the North Pacific Hall. Am. Mus. J. 10(8): 226–229.
- 1911a. Rare elephant seals for the Museum. Ibid. 11(4): 109–112.
- 1911b. Foreword on the new mural paintings in the American Museum. Ibid.: 129–130.
- 1911c. Some methods and results in herpetology. Ibid. 11(6): 202–212.
- 1912a. A note on poisonous snakes. Ibid. 12(1): 30–31.
- 1912b. A python from the Philippines. Ibid. 12(3): 112–114.
- 1912c. A note on the giant salamander group. Some problems in panoramic group construction. Ibid. 12(8): 310–314.
- 1914a. Charles R. Knight—painter and sculptor of animals. With an introduction relative to the union of art and science in the American museum. Ibid. 14(3): 82–98.
- 1914b. The new African hall planned by Carl E. Akeley. Principles of construction which strike a revolution in methods of exhibition and presage the future greatness of the educational museum. Ibid. 14(5): 174–187.
- 1914c. Forestry in the State of New York. Ibid. 14(6 & 7): 221–224.
- 1915a. The "toad group" in the American Museum: a word as to its composite construction and interest. Ibid. 15(4): 162–166.
- 1916a. Photographs from the beaches and shallow waters of the Massachusetts coast during the month of September. Ibid. 16(6): 367–378.
- 1916b. Some structures and instincts of common insects. Ibid. 16(8): 529–532.
- 1916c. Description of a new amphisbaenian

collected by the late Dr. Charles S. Mead in 1911, on the Isle of Pines, Cuba. *Bull. Am. Mus. Nat. Hist.* 35(34): 659–662.

- 1917a. Winter photographs from the woods and fields of Massachusetts with quotations selected from Thoreau's *Journal on Winter in Massachusetts*. *Am. Mus. J.* 17(1): 41–56.
- 1917b. The jack rabbit in California. *Ibid.* 17(1): 70–75.
- 1917c. The season of wild flowers. With reproductions in duotone and suggestions regarding certain species needing protection. *Ibid.* 17(5): 303–318.
- 1917d. Systematic note on Lower California lizards. *Copeia* 50: 96–98.
- 1917e. Introductory note. In E. R. Dunn, *Reptile and amphibian collections from the North Carolina mountains*, with special reference to salamanders. *Bull. Am. Mus. Nat. Hist.* 37(23): 593.
- 1918. Second Thule Expedition under Rasmussen. *Am. Mus. J.* 18(5): 390–393.
- 1919a. Diagnoses of twenty-three new species and a new genus of lizards from Lower California. *Bull. Am. Mus. Nat. Hist.* 41(10): 461–477.
- 1920a. The golden jubilee of the Metropolitan Museum of Art, 1870–1920. With a prophecy of the people's museum of the immediate future. *Nat. Hist.* 20(4): 452–465.
- 1920b. Objects that symbolize the common life in Tibet. With reference to a new and very valuable collection recently obtained by the American Museum from southern Tibet. *Ibid.*: 469–472.
- 1920c. A case in point to prove the value of prolonged research. *Ibid.*: 502.

DICKERSON'S AMNH ANNUAL REPORTS

This section includes Dickerson's reports for Woods and Forestry as well as for Herpetology. Her authorship is assumed but is not explicit for a few of the herpetology reports (e.g., 1912d, 1913a). Dickerson was institutionalized late in 1920 before copy for that year's annual report was due. In a letter dated December 28, 1920, to Director F. A. Lucas, Noble stated that

I have brought together data which may be used as an annual report for the Department of Herpetology. I am not at all sure that I have put this data in just the form Miss Dickerson would have wished but at your suggestion I have appended her name to the enclosed report.²⁴²

However, the published report carried the by-line "G. K. Noble, Assistant Curator, in Charge" and it is credited to him (Noble, 1921l).

- 1911d. Living Reptiles and Batrachians. In Bashford Dean and Louis Hussakof, *Living Reptiles, Batrachians, Living and Extinct Fishes*. 42nd Ann. Rept. AMNH 1910: 39–41, 85–87 + 1 pl. (photograph of wax cast of a bushmaster with eggs).
- 1911e. Woods and Forestry. *Ibid.*: pp. 53–54.
- 1912d. Amphibians and Reptiles. In Bashford Dean, *Existing Reptiles, Batrachians, Recent and Extinct Fishes*. 43rd Ann. Rept. AMNH 1911: 50, 108–109.
- 1912e. Woods and Forestry. *Ibid.*: 65–66, 123 + 1 pl. (photograph of wax reproduction of catalpa flowers and leaves).
- 1913a. Amphibians and Reptiles. In Bashford Dean, *Existing Reptiles, Batrachians, Recent and Extinct Fishes*. 44nd Ann. Rept. AMNH 1912: 57, 133–137 + 1 pl. (photograph of diorama, Giant Salamander Group).
- 1913b. Woods and Forestry. *Ibid.*: 76–77, 152.
- 1914d. Existing Reptiles and Batrachians. In Bashford Dean, Louis Hussakof, and Mary Cynthia Dickerson, *Department of Ichthyology and Herpetology*. 45th Ann. Rept. AMNH 1913: 61–63, 125–126 + 1 pl. (showing a diorama, "Lower California Group, Reptile Life in the Desert").
- 1914e. Department of Woods and Forestry. *Ibid.*: 75–77, 134.
- 1915b. Reptiles and Batrachians. In Bashford Dean, Louis Hussakof, and Mary Cynthia Dickerson, *Department of Ichthyology and Herpetology*. 46th Ann. Rept. AMNH 1914: 65–67, 126.
- 1915c. Department of Woods and Forestry. *Ibid.*: 81–83, 133 + 1 pl. (photograph of pines on estate of the late Morris K. Jesup, Lenox, Mass.).
- 1916d. Department of Woods and Forestry. 47th Ann. Rept. AMNH 1915: 59, 120.
- 1916e. Reptiles and Batrachians. In Bashford Dean, Louis Hussakof, and Mary Cynthia Dickerson, *Department of Ichthyology and Herpetology*. *Ibid.*: 65–68, 125 + 1 pl. (photograph of models of 3 fowler's toads and a *Trillium* in the new "Toad Group"—a diorama).
- 1917f. Department of Woods and Forestry. 48th Ann. Rept. AMNH 1916: 63–64, 177 + 1 pl. (photograph of bust of Charles Sprague Sargent).

- 1917g. Reptiles and Batrachians. In Bashford Dean and Mary Cynthia Dickerson, Department of Ichthyology and Herpetology. Ibid.: 71–75, 183–185 + 1 pl. (photograph of a cypress swamp—“field study for the “Florida Reptile Group”).
- 1918a. Woods and Forestry. 49th Ann. Rept. AMNH 1917: 67–68, 188.
- 1918b. Reptiles and Amphibians. In Bashford Dean and Mary Cynthia Dickerson, Recent and Extinct Fishes, Existing Reptiles and Batrachians. Ibid.: 75–79, 193–194 + 1 pl. (photograph of a diorama, “Florida Reptile Group, Detail of the Group”).
- 1919b. Woods and Forestry. 50th Ann. Rept. AMNH 1918: 64–65, 185–186 + 1 pl. (photograph of a spray of record magnolia reproduced in wax).
- 1919c. Reptiles and Batrachians. In Bashford Dean and Mary Cynthia Dickerson, Recent and Extinct Fishes, Existing Reptiles and Batrachians. Ibid.: 74–76, 188–190.
- 1920d. Woods and Forestry. 51st Ann. Rept. AMNH 1919: 70–71, 205.
- 1920e. Existing Reptiles and Amphibians. Ibid.: 82–86, 210–212.

APPENDIX 3: BIBLIOGRAPHY OF GLADWYN KINGSLEY NOBLE (1894–1940)

Noble’s extensive bibliography of approximately 250 titles has not previously been published. (W. K. Gregory tried unsuccessfully to have one published along with Noble’s obituary notice in 1942.²⁴³) A listing of most of his herpetological papers was provided by Necker (1940), based in part on the unacknowledged help of C. M. Bogert. Noble’s herpetological papers comprise about 67% of his total publications (exclusive of published annual reports).

An attempt is made here to provide all titles, except that no effort was made to search for articles that may have been written for school magazines.²⁴⁴ The first and most important source is a series of typescript bibliographies in the Department of Herpetology Archives. The earliest of these might have been prepared by Noble, but later ones seem to have been prepared and maintained by his secretary or other assistants. Not all his publications were recorded in a timely way, and a handful were completely overlooked. The papers were numbered from the beginning, and there is virtually no change in numbering over time; overlooked papers simply were later given a letter designation (e.g., “13a”).

One 10-page typescript “List of Published Papers of G. K. Noble” has the typed notation “Compiled by (Mrs.) Esther Stetzer” (i.e., Esther Langslow [née Stetzer], Herpetology secretary). This was prepared in at least two typings, one for numbered citations 1–143 (1913–1935) and a newer section for numbers 144–178 (1935–1941). This probably was the manuscript bibliography that Gregory attempted to have published (see note 243). Entries in Mrs. Langslow’s list sometimes have incomplete citation data and one or more words dropped from titles. One extreme instance is “1922 Reptiles. Father and Son Library”

(cf. 1921k below). This was cited identically as a “not seen” article by Necker (1940: 48), who probably got Mrs. Langslow’s citation from C. M. Bogert.²⁴⁵

A more complete source, with better detail and with additional titles inserted, is a 13-page typescript “Bibliography” that was maintained in the Department of Experimental Biology after Noble’s death. This document contains 175 numbered entries for the period 1913–1940; additional entries 176–187 for posthumous papers are given in a section labeled “Reported by Junior Authors.” These last entries include four typed citations and several written in pencil (one of which does not bear Noble’s name in the publication and is therefore excluded here). An additional typescript labeled “Index—G. K. Noble Reprints,” done in a slightly different style, may have been typed from the other “Bibliography,” but it is less reliable and accurate, although there is congruence in the item numbers. Both documents have been checked against a half-dozen binders of reprints (including typed copies of some papers) that bear corresponding numbers in pencil. These reprint binders and the last two bibliographies had been saved in the old Department of Animal Behavior (successor to Noble’s Experimental Biology), and I am grateful to Curator Emerita Ethel Tobach for turning them over to the Herpetology Archives.

Although extensive, the aforesaid manuscript bibliographies and reprints are incomplete, lacking Noble’s frequent book reviews in *Natural History* and a few other items (e.g., 1922d, 1931a) that have been added with the help of Grace Tilger. I have omitted the original numbering system and have added letter designations to papers published in the same year, continuing into the sep-

arate listing of annual reports. Aside from segregating (and adding to) the annual reports, I have not separated Noble's research papers from popular publications, abstracts, and reviews—the abstracts and popular papers especially were usually tied closely to his ongoing research. However, abstracts and reviews have been arbitrarily moved to the end of a year. Otherwise, the ordering of titles within a year is similar to the typescript bibliographies, with modification only of egregious inconsistencies (e.g., priority of publication being reversed in pairs of sequentially numbered *Novitates*). For various reasons therefore, the assigned lettering does not reflect chronology by month of publication within a given year.

After Noble's death in 1940, Bogert wrote (in AMNH Annual Report for 1941) that

A manuscript dealing with coecilians was left by the late Curator . . . and, after preliminary preparation for its publication was undertaken, was turned over to the foremost authority on coecilians, Dr. E. R. Dunn, for editing.

This paper, however, was never published.²⁴⁶

1913. The depredations of cats on Muskeget Island. The Warbler (Bull. John Lewis Childs Mus. Library Nat. Hist.) 7: 25–26.
- 1914a. American egret (*Herodias egretta*) at Martha's Vineyard, Mass. Auk 31: 100.
- 1914b. Killdeer plover at Cambridge, Mass. Ibid.: 101.
- 1914c. Turkey vulture (*Cathartes aura septentrionalis*) at Martha's Vineyard, Mass. Ibid.: 101.
- 1915a. Notes on the water snake *Natrix compressicauda*. Proc. Acad. Nat. Sci., Philadelphia 67: 29–35 (2nd author, with T. Barbour).
- 1915b. A revision of the lizards of the genus *Ameiva*. Bull. Mus. Comp. Zool. 59(6): 417–479 (2nd author, with T. Barbour).
- 1915c. A new dove from St. Croix, Danish West Indies. Proc. New Engl. Zool. Club 5: 101–102.
- 1916a. Description of a new eublepharid lizard from Costa Rica. Proc. Biol. Soc. Washington 29: 87–88.
- 1916b. A revision of the lizards of the genus *Cyclura*. Bull. Mus. Comp. Zool. 60(4): 139–164 + pls. 1–15 (2nd author, with T. Barbour).
- 1916c. New amphibians and a new reptile from Sarawak. Proc. New Engl. Zool. Club 6: 19–22 + pl. 2 (2nd author, with T. Barbour).
- 1916d. The resident birds of Guadeloupe. Bull. Mus. Comp. Zool. 60(10): 359–396.
1917. The systematic status of some batrachians from South America. Bull. Am. Mus. Nat. Hist. 37(30): 793–814 + pls. 93–96.
- 1918a. The amphibians collected by the American Museum Expedition to Nicaragua in 1916. Ibid. 38(10): 311–347 + pls. 14–19.
- 1918b. Description of a new woodpecker from Peru. Proc. New Engl. Zool. Club 6: 85–86 (2nd author, with Outram Bangs).
- 1918c. List of birds collected on the Harvard Peruvian Expedition of 1916. Auk 35(4): 443–463 (2nd author, with Outram Bangs).
- 1918d. (Abstract) Life history of the marsupial frog. Copeia 53: 14–15.
1919. Notes on the avifauna of Newfoundland. Bull. Mus. Comp. Zool. 62(14): 543–568.
- 1920a. Some amphibians from northwestern Peru, with a revision of the genera *Phyllobates* and *Telmatobius*. Ibid. 63(8): 395–427 + pls. 1–3 (2nd author, with T. Barbour).
- 1920b. Amphibians and reptiles from southern Peru collected by the Peruvian Expedition of 1914–1915 under the auspices of Yale University and the National Geographic Society. Proc. U.S. Natl. Mus. 58(2352): 609–620 (2nd author, with T. Barbour).
- 1920c. A note on *Babina*, the dagger-frog. Copeia 79: 16–18.
- 1920d. An early record for the oviposition and hatching of the milk snake. Ibid. 88: 98–100.
- 1920e. Two new batrachians from Colombia. Bull. Am. Mus. Nat. Hist. 42(9): 441–446.
- 1921a. Some new lizards from northwestern Peru. Ann. N.Y. Acad. Sci. 29: 133–139.
- 1921b. The bony structure and phyletic relations of *Sphaerodactylus* and allied lacertilian genera, with the description of a new genus. Am. Mus. Novitates 4: 16 pp.
- 1921c. The anterior cranial elements of *Oedipus* and certain other salamanders. Bull. Am. Mus. Nat. Hist. 44(1): 1–6 + pls. 1–2.
- 1921d. Do snakes swallow their young for protection? Copeia 98: 54–57.
- 1921e. Snakes that inflate. The significance of an aggressive warning attitude assumed

- by certain reptiles. *Nat. Hist.* 21(2): 166–171.
- 1921f. A search for the marsupial frog. *Ibid.* 21(5): 474–485.
- 1921g. Pages from the photographic journal of the Harvard-Peruvian Expedition. *Ibid.* 21(5): 486–494.
- 1921h. Five new species of Salientia from South America. *Am. Mus. Novitates* 29: 7 pp.
- 1921i. Purple salamander. *Copeia* 100: 79–80 (2nd author, with P. H. Pope).
- 1921j. Two new lizards from northwestern Peru. *Ann. N.Y. Acad. Sci.* 29: 141–143.
- 1921k. Things to know about reptiles. In G. C. Fisher, *Nature's secrets 2*. Father and Son Library, vol. 12: 289–320 + 4 color pls. New York: The University Society Inc. (See also 1940e.)
- 1922a. [Additional record of *Ascaphus*]. *Copeia* 102: 6.
- 1922b. The phylogeny of the Salientia 1. The osteology and the thigh musculature; their bearing on classification and phylogeny. *Bull. Am. Mus. Nat. Hist.* 46(1): 1–87 + foldout table + pls. 1–23.
- 1922c. A further note on snakes swallowing their young. *Copeia* 105: 30.
- 1922d. The mystery of the marsupial frog. *The Mentor* 10(8): 38–39.
- 1922e. Suggestions for collecting salamanders. *Am. Mus. Nat. Hist. Collectors Leaflet* 3: 3 pp. [See documentation referenced under *Collecting Pamphlets and Other Propaganda for 1922 vs. 1921 publication date.*]
- 1922f. A salamander hike. *Scouting* 10(3): 7.
- 1923a. Six new batrachians from the Dominican Republic. *Am. Mus. Novitates* 61: 6 pp.
- 1923b. The carpus of *Eryops* and the structure of the primitive Chiropterygium. *Bull. Am. Mus. Nat. Hist.* 48(10): 279–288 (last author, with W. K. Gregory and R. W. Miner).
- 1923c. (Abstract) The carpus of *Eryops* and the structure of the primitive chiropterygium. *Anat. Rec.* 25(3): 144–145. [“These observations were made in collaboration with Dr. W. K. Gregory and R. W. Miner.”]
- 1923d. Four new lizards from Beata Island, Dominican Republic. *Am. Mus. Novitates* 64: 5 pp.
- 1923e. In pursuit of the giant tree frog. Night hunting in Santo Domingo by the Angelo Heilprin Expedition. *Nat. Hist.* 23(2): 104–116.
- 1923f. Field studies of Dominican tree frogs and their haunts. *Ibid.* 23(2): 117–121.
- 1923g. The generic and genetic relations of *Pseudacris*, the swamp tree frogs. *Am. Mus. Novitates* 70: 6 pp.
- 1923h. *Chelys* and the phylogeny of the turtles. *Am. Nat.* 57: 377–379.
- 1923i. The Anderson tree frog (*Hyla anderssonii* Baird). Observations on its habits and life history. *Zoologica* 2(18): 413–455 (1st author, with Ruth C. Noble).
- 1923j. Voice as a factor in the mating of batrachians. *Science* 58(1501): 270–271.
- 1923k. New batrachians from the Tropical Research Station, British Guiana. *Zoologica* 3(14): 288–299.
- 1923l. New lizards from the Tropical Research Station, British Guiana. *Ibid.* 3(15): 301–305.
- 1923m. A new gekkonid lizard and a new brachycephalid frog from Colombia. *Am. Mus. Novitates* 88: 3 pp.
- 1923n. Her [Mary Cynthia Dickerson's] studies of reptiles and amphibians. *Ibid.* 23(5): 514–516.
- 1923o. Trailing the Rhinoceros iguana. How the facts presented in the group of these reptiles recently installed in the American Museum, were obtained in the field by the Angelo Heilprin Expedition. *Nat. Hist.* 23(6): 540–558.
- 1924a. Contributions to the herpetology of the Belgian Congo based on the collection of the American Museum Congo Expedition, 1909–1915. Pt. III. Amphibia. With abstracts from the field notes of Herbert Lang and James P. Chapin. *Bull. Am. Mus. Nat. Hist.* 49(2): 147–347 + pls. 23–42. (Reprinted in facsimile in 1998 by Society for the Study of Amphibians and Reptiles, with a new Introduction by J. C. Poynton.)
- 1924b. The origin of the mammalian alisphenoid bone. *J. Morphol. Physiol.* 39(2): 435–463 (2nd author, with William King Gregory).
- 1924c. Some Neotropical batrachians preserved in the United States National Museum with a note on the secondary sexual characters of these and other amphibians. *Proc. Biol. Soc. Washington* 37: 65–71.
- 1924d. A new genus of discoglossid frogs from the Philippine Islands. *Am. Mus. Novitates* 121: 4 pp. (2nd author, with Edward H. Taylor).

- 1924e. New lizards from northwestern Peru. Occas. Pap. Boston Soc. Nat. Hist. 5: 107–113.
- 1924f. A new spadefoot toad from the Oligocene of Mongolia with a summary of the evolution of the Pelobatidae. Am. Mus. Novitates 132: 15 pp.
- 1924g. (Abstract) The “retrograde metamorphosis” of the Sirenidae; experiments on the functional activity of the thyroid of the perennibranchs. Anat. Rec. 29(2): 100.
- 1924h. (Abstract) The integumentary, pulmonary, and cardiac modifications correlated with increased cutaneous respiration in the Amphibia. Ibid. 29(2): 110–111.
- 1925a. The evolution and dispersal of the frogs. Am. Nat. 59(662): 265–271.
- 1925b. A new genus of Surinam toads (Pipidae). Am. Mus. Novitates 164: 3 pp.
- 1925c. An outline of the relation of ontogeny to phylogeny within the Amphibia. I. Ibid. 165: 17 pp.
- 1925d. An outline of the relation of ontogeny to phylogeny within the Amphibia. II. Ibid. 166: 10 pp.
- 1925e. The integumentary, pulmonary, and cardiac modifications correlated with increased cutaneous respiration in the Amphibia: a solution of the “hairy frog” problem. J. Morphol. Physiol. 40(2): 341–416.
- 1925f. The Department of Reptiles and Amphibians in the American Museum [and] Glimpses of the new Hall of Reptile and Amphibian Life. Nat. Hist. 25(4): 381–384 + 12 unnumbered pp. of pls. with text.
- 1926a. An analysis of the remarkable cases of distribution among the Amphibia, with descriptions of new genera. Am. Mus. Novitates 212: 24 pp.
- 1926b. The importance of larval characters in the classification of South African Salientia. Ibid. 237: 10 pp.
- 1926c. The “buccal brooding habits” of the African tree frog *Leptopelis brevirostris*. Copeia 154: 134–135.
- 1926d. The Long Island newt: a contribution to the life history of *Triturus viridescens*. Am. Mus. Novitates 228: 11 pp.
- 1926e. The hatching process in *Alytes*, *Eleutheroedactylus* and other amphibians. Ibid. 229: 7 pp.
- 1926f. The pectoral girdle of the brachycephalid frogs. Ibid. 230: 14 pp.
- 1926g. A synopsis of the brevicipitid toads of Madagascar. Ibid. 232: 21 pp. (1st author, with H. W. Parker).
- 1926h. Mounting by paraffin infiltration. A method for the permanent preservation of whole specimens or dissections. Ibid. 233: 7 pp. (1st author, with M. E. Jaekle).
- 1926i. Kammerer’s *Alytes*. Nature 118(2962): 209–210.
- 1926j. Kammerer’s *Alytes*. Ibid. 118(2971): 518.
- 1926k. (Abstract) The relation of life-history to phylogeny within the amphibia. Rept. Br. Assoc. Adv. Sci. 1925: 322–323.
- 1926l. (Abstract) The phylogenesis of the tree-climbing apparatus of the Amphibia. Anat. Rec. 34(3): 138 (1st author, with M. E. Jaekle).
- 1926m. (Abstract) The production of cloacal glands in the adult female *Desmognathus fuscus* by testicular transplants; the change of tooth form in the adult male by castration. Ibid.: 140.
- 1927a. What is inherited? The bearing of some recent experiments in the American Museum on the problem of an animal’s inheritance. Nat. Hist. 27(1): 45–53.
- 1927b. The value of life history data in the study of the evolution of the amphibia. Ann. N.Y. Acad. Sci. 30: 31–128 + pl. 9.
- 1927c. The plethodontid salamanders; some aspects of their evolution. Am. Mus. Novitates 249: 26 pp.
- 1927d. [Notes on Amphibia]. In H. F. Osborn, The origin of species, V: Speciation and mutation. Am. Nat. 61(672): 16–18.
- 1927e. The bullfrog in Cuba. Copeia 163: 59–60 (2nd author, with W. H. Hoffman).
- 1927f. (Review of) The elements of general zoology. A guide to the study of animal biology correlating function and structure with notes on practical exercises, by William J. Dakin. Science 65(1690): 501.
- 1927g. Distributional list of the reptiles and amphibians of the New York City region. Am. Mus. Nat. Hist., Guide Leaflet Ser., no. 69, 9 pp. + 5 blank pp. for notes. (See also 1929e.)
- 1927h. Creatures of perpetual night. An account of the American Museum’s expedition to the caves of the Ozarks in search of the blind salamander. [And] In the underground home of the blind salamander. Glimpses of the passage-

- ways which honeycomb the Ozark Mountains and some portraits of the creatures which dwell in the subterranean world. *Nat. Hist.* 27 (5): 405–419 [and] 9 unnumbered pages of photographs with legends.
- 1927i. Reptiles. Boy Scout handbook for boys: 499–506.
- 1928a. The digital pads of the tree frogs. A study of the phylogenesis of an adaptive structure. *J. Morphol. Physiol.* 45(1): 259–292 (1st author, with Miriam Etta Jaecle).
- 1928b. Two new fossil Amphibia of zoögeographic importance from the Miocene of Europe. *Am. Mus. Novitates* 303: 13 pp.
- 1928c. Creatures of perpetual night. An account of an expedition to the Ozarks in search of the blind salamander. *Sci. Am.* 139(Nov.): 430–432. [reprinted version of 1927h]
- 1928d. (Abstract) The effect on the dentition and cloaca of testicular transplants in the adult female salamander, *Desmognathus*; the effect of castration on the male. *Anat. Rec.* 38(1): 24 (1st author, with S. H. Davis [Sarah H. Pope]).
- 1928e. (Abstract) The effect of light on the eyes, pigmentation, and behavior of the cave salamander, *Typhlotriton*. *Ibid.* 41(1): 21 (1st author, with Sarah H. Pope).
- 1929a. The breeding habits of two salamanders. *Am. Mus. Novitates* 347: 12 pp. (1st author, with B. C. Marshall).
- 1929b. Further observations on the life-history of the newt, *Triturus viridescens*. *Ibid.* 348: 22 pp.
- 1929c. The spermatophores of *Desmognathus* and other plethodontid salamanders. *Ibid.* 351: 15 pp. (1st author, with J. A. Weber).
- 1929d. The adaptive modifications of the arboreal tadpoles of *Hoplophryne* and the torrent tadpoles of *Staurois*. *Bull. Am. Mus. Nat. Hist.* 58(7): 291–334 + pls. 15, 16.
- 1929e. Distributional list of the reptiles and amphibians of the New York City region. *Am. Mus. Nat. Hist., Guide Leaflet Series No. 69*: 16 pp. (numbered pp. 10–16 blank for notes). [Slightly revised reprint of 1927g.]
- 1929f. The relation of courtship to the secondary sexual characters of the two-lined salamander, *Eurycea bislineata* (Green). *Am. Mus. Novitates* 362: 5 pp.
- 1929g. The method of sex recognition in the wood-frog, *Rana sylvatica* Le Conte. *Ibid.* 363: 17 pp. (1st author, with E. J. Farris).
- 1929h. The modification of the cloaca and teeth of the adult salamander, *Desmognathus*, by testicular transplants and by castration. *Br. J. Exp. Biol.* 6(4): 399–411 + pls. 8, 9 (1st author, with S. H. Pope).
- 1929i. Amphibia. *The Encycl. Britannica*, 14th Ed., 1: 832–840. London and New York. (See also 1933h.)
- 1929j. Coecilia. *Ibid.*, 5: 960–961.
- 1929k. (Abstract) A metamorphic change produced in *Cryptobranchus* by thyroid solutions. *Anat. Rec.* 42(1): 59 (1st author, with E. J. Farris).
- 1930a. What produces species? Recent laboratory and field work give a solution to a problem of long standing. *Nat. Hist.* 30(1): 60–70.
- 1930b. The induction of egg-laying in the salamander, *Eurycea bislineata*, by pituitary transplants. *Am. Mus. Novitates* 396: 3 pp. (1st author, with L. B. Richards).
- 1930c. The fossil frogs of the Intertrappean beds of Bombay, India. *Ibid.* 401: 13 pp.
- 1930d. Probing life's mysteries. Some aspects of the research work of the American Museum. *Nat. Hist.* 30(5): 469–482.
- 1930e. Organic evolution. *The American Year Book. A record of events and progress, year 1929*: 692–695. New York: The American Year Book Corp.
- 1930f. (Abstract) The eggs of *Pseudobranchius*. *Copeia* 1930(2): 52.
- 1930g. (Abstract) The courtship of the plethodontid salamanders. *Ibid.*: 52–54 (1st author, with M. K. Brady).
- 1930h. (Abstract) The courtship of some iguanid and teiid lizards. *Ibid.*: 54–56 (1st author, with H. K. Teale).
- 1930i. (Abstract) The mechanism of hatching in the marbled salamander. *Anat. Rec.* 45(3): 274 (1st author, with M. K. Brady).
- 1930j. (Abstract) The induction of ovulation in salamanders by anterior-pituitary transplants. *Ibid.*: 274–275 (1st author, with L. B. Richards).
- 1930k. (Abstract) A metamorphic change produced in *Siren* by thyroxin injections.

- Ibid.: 275 (1st author, with L. B. Richards).
- 1931a. The "Basilisk." A yawl built especially to aid certain scientific studies among the islands of the West Indies. A duplicate of the little craft in which Joshua Slocum circumnavigated the globe. *Nat. Hist.* 31(1): 93–100.
- 1931b. Observations on the life history of *Ascapheus truei* Stejneger. *Copeia* 1931(3): 97–101 (1st author, with Phillips G. Putnam).
- 1931c. The biology of the Amphibia. New York: McGraw-Hill, xiii + 577 pp. (Reprinted 1955, with Biographical Note by Ruth Crosby Noble. New York: Dover.)
- 1931d. (Abstract) The hedonic glands of the plethodontid salamanders and their relation to sex hormones. *Anat. Rec.* 48(Suppl.): 57–58.
- 1931e. (Abstract) The criteria of metamorphosis in urodeles. Ibid.: 58 (1st author, with L. B. Richards).
- 1931f. (Abstract) An induced metamorphic change in the perennibranch urodele, *Pseudobranchius*. Ibid. 51(1, Suppl.): 35 (1st author, with L. B. Richards).
- 1931g. (Abstract) The relation of the thyroid and pituitary to the molting process of the lizard *Hemidactylus brookii*. Ibid.: 42 (1st author, with Helen T. Bradley).
- 1931h. (Abstract) The rate of molting in lizards. Ibid.: 56 (1st author, with Helen T. Bradley).
- 1931i. (Newspaper) [Recent advances in our knowledge of sex] In William Engle (staff writer), Going and getting it for science. Biologists look to lizards for answers to riddles of life. *New York World-Telegram*, 63(298), Friday, June 19. [The title *Recent advances in our knowledge of sex* appears in Noble's typescript bibliography with simply a June 1931 date and has several times been cited this way by Mitman (e.g., 1992: 196, 243). However, a page-by-page microfilm search of the newspaper yielded only Engle's June 19th column about Noble, who is extensively quoted. I assume that Noble either submitted a typescript article abstracted by Engle, or else an assistant erroneously added the entry to his bibliography. The absence of a specific date suggests the possibility that Noble (or assistant) may not have seen the article, which was one of a series of columns by Engle about the Museum.]
- 1932a. Experiments on the egg-laying of salamanders. *Am. Mus. Novitates* 513: 25pp. (1st author, with L. B. Richards).
- 1932b. The validity of *Siren intermedia* Lecomte, with observations on its life history. Ibid. 532: 17 pp. (1st author, with B. C. Marshall).
- 1932c. Observations and experiments on the life history of the salamander, *Desmognathus fuscus fuscus* (Rafinesque). Ibid. 533: 16 pp. (1st author, with Gertrude Evans).
- 1932d. The reptiles of Great Inagua Island, British West Indies. Ibid. 549: 25 pp. (1st author, with G. C. Klingel).
- 1932e. Effect of anterior pituitary upon production of red pigment in the salamander *Pseudotriton ruber ruber* (Soninni [sic]). *Proc. Soc. Exp. Biol. Med.* 30(1): 9–11 [2 unnumbered pp. in reprint] (1st author, with L. B. Richards).
- 1932f. Comparative anatomy. *The Natl. Encycl.* 3: 198–201. New York: Collier.
- 1932g. Organic evolution. Ibid. 7: 441–442.
- 1932h. Organic evolution. *The American Year Book*. A record of events and progress, year 1931: 730–731. New York: The American Year Book Corp.
- 1932i. (Abstract) The effect of temperature on the scale form of regenerated lizard skin. *Anat. Rec.* 54(3), Suppl.: 58–59 (with Helen Teal Bradley).
- 1932j. (Abstract) The relation of water regulation to habitat selection of reptiles. *Science* 76(1980): 545–546 (with E. R. Mason).
- 1932k. (Review of) Snakes of the world, by Raymond L. Ditmars. *Nat. Hist.* 32(1): 109.
- 1932l. (Review of) The social life of monkeys and apes, by S. Zuckerman. Ibid. 32(5): 560.
- 1933a. The effect of temperature on the scale form of regenerated lizard skin. *J. Exp. Zool.* 65(1): 1–16 (1st author, with Helen Teal Bradley).
- 1933b. The relationships of some common amphibia as determined by serological study. *Am. Mus. Novitates* 606: 24 pp. (2nd author, with Alan Boyden).
- 1933c. Experiments on the brooding habits of the lizards *Eumeces* and *Ophisaurus*. Ibid. 619: 29 pp. (1st author, with E. R. Mason).
- 1933d. The mating behavior of lizards; its bearing on the theory of sexual selec-

- tion. Ann. New York Acad. Sci. 35(2): 25–100 (1st author, with H. T. Bradley).
- 1933e. Observations on the life history of the marbled salamander, *Ambystoma opacum* Gravenhorst. Zoologica 11(8): 89–132 (1st author, with M. K. Brady).
- 1933f. The relation of the thyroid and the hypophysis to the molting process in the lizard, *Hemidactylus brookii*. Biol. Bull. 64(3): 289–298 (1st author, with Helen T. Bradley).
- 1933g. Two new species of frogs, five new species and a new race of lizards from the Dominican Republic. Am. Mus. Novitates 652: 17 pp. (1st author, with W. G. Hassler).
- 1933h. Amphibia. Britannica Booklet 8: 2–8. (Reprinted from Encycl. Britannica, see 1929i.)
- 1933i. (Review of) Educational biology, by W. A. Atwood and E. D. Heiss. Nat. Hist. 33(4): 458.
- 1934a. Experimenting with the courtship of lizards. Field studies on the social relations among the fence lizards of the New Jersey pine barrens. Ibid. 34(1): 5–15.
- 1934b. Sex recognition in the sunfish, *Eupomotis gibbosus* (Linné). Copeia 1934(4): 151–154.
- 1934c. (Abstract) The hypertrophy of the tactile organs of snakes in correlation with sexual functions. Anat. Rec. 58(2, Suppl.): 3–4.
- 1934d. (Abstract) The structure of the facial pit of the pit vipers and its probable function. Ibid.: 4.
- 1934e. (Abstract) The function of Jacobson's organ in lizards. Ibid.: 5–6 (1st author, with K. F. Kumpf).
- 1934f. (Abstract) Factors controlling the form and color of scales on the regenerated tails of lizards. Ibid. 60(4, Suppl.): 87–88 (1st author, with H. J. Clausen).
- 1934g. A benefactor of the tropics. (Review of an article by M. D. Leonard on food of *Bufo marinus*, in J. Econ. Entomol.). Nat. Hist. 34(2): 202.
- 1934h. (Review of) The behavior of animals, by E. S. Russell. Ibid. 34(5): 502.
- 1935a. The brooding habit of the blood python and of other snakes. Copeia 1935(1): 1–3.
- 1935b. A new giant *Anolis* from Cuba. Ibid. 1935(3): 113–115 (1st author, with W. G. Hassler).
- 1935c. An experimental study of sex recognition in birds. Auk 52: 278–286 + pls. 14, 15 (1st author, with William Vogt).
- 1935d. The four-eyed fish. A fish that sees both above and below the water surface—the first stage in the evolution of vision in the air. Nat. Hist. 36(1): 34–36.
- 1935e. (Abstract) Sexual selection in fishes. Anat. Rec. 64(1, Suppl.): 84–85 (1st author, with Brian Curtis).
- 1935f. (Abstract) The sensory mechanisms involved in the migration of newly hatched fresh water turtles. Ibid. 64: 88 (1st author, with A. Braslovsky).
- 1935g. (Review of) Confessions of a scientist, by Raymond L. Ditmars. Nat. Hist. 35(1): 88.
- 1935h. (Review of) Introduction to human anatomy. Guide to section 1 of the Hall of the natural history of man, by William K. Gregory and Marcelle Roigneau. Ibid. 35(2): 177–178.
- 1935i. (Review of) The reptiles of China, by Clifford H. Pope. Ibid. 36(2): 177.
- 1935j. (Review of) The empire of the snakes, by F. G. Carnochan and H. C. Adamson. Ibid.: 179.
- 1935k. (Review of) Comparative psychology, by F. A. Moss et al. Ibid. 36(3): 273–274.
- 1935l. (Review of) Pacemakers in relation to aspects of behavior, by Hudson Hoagland. Ibid. 36(4): 364.
- 1935m. (Review of) Von Ottern und Nattern, ein Schlangenbuch, by Hans Weltzel. Ibid.: 367.
- 1936a. The aggregation behavior of *Storeria dekayi* and other snakes with special reference to the sense organs involved. Ecol. Monogr. 6(2): 269–316 (1st author, with H. J. Clausen).
- 1936b. Factors controlling the form and color of scales on the regenerated tails of lizards. J. Exp. Zool. 73(2): 209–225 + pls. 1, 2 (1st author, with H. J. Clausen).
- 1936c. Three Salientia of geographic interest from southern Maryland. Copeia 1936(1): 63–64 (1st author, with W. G. Hassler).
- 1936d. The function of Jacobson's organ in lizards. J. Genet. Psychol. 48(2): 371–382 (1st author, with K. F. Kumpf).
- 1936e. Courtship and sexual selection of the flicker (*Colaptes auratus luteus*). Auk 53: 269–282 + pls. 15, 16.
- 1936f. Dr. G. Kingsley Noble tells why “Animals don't behave like human beings.” New Horizons (publ. by “The

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- 1936g. (Abstract) The function of the corpus striatum in the social behavior of fishes. *Anat. Rec.* 64(4, Suppl.): 34.
- 1936h. (Abstract) The induction of brooding behavior in the jewel fish. *Ibid.* 67(1, Suppl.): 50–51 (1st author, with K. F. Kumpf and V. N. Billings).
- 1936i. (Abstract) The sexual behavior and secondary sexual characters of gonadectomized fish. *Ibid.* 67(1, Suppl.): 113 (1st author, with K. F. Kumpf).
- 1936j. (Review of) The alligator's life history, by E. A. McIlhenny. *Nat. Hist.* 37(1): 97–98.
- 1936k. (Review of) 1001 questions answered about your aquarium. *Ibid.* 37(3): 281.
- 1936l. (Review of) Genetics, by H. S. Jennings. *Ibid.* 37(5): 469.
- 1937a. The structure and function of the facial and labial pits of snakes. *Proc. Am. Philos. Soc.* 77(3): 263–288 + pls. 1–5 (1st author, with A. Schmidt).
- 1937b. Prolactin-like reaction produced by hypophyses of various vertebrates. *Proc. Soc. Exp. Biol. Med.* 36: 517–518 (1st author, with C. P. Leblond).
- 1937c. The sense organs involved in the courtship of *Storeria*, *Thamnophis* and other snakes. *Bull. Am. Mus. Nat. Hist.* 73(7): 673–725 + pls. 8–10.
- 1937d. (Abstract) Effect of lesions of the corpus striatum on the brooding behavior of cichlid fishes. *Anat. Rec.* 70(1, Suppl.): 58.
- 1937e. (Abstract) Sex reversal in the fighting fish, *Betta splendens*. *Ibid.*: 97 (1st author, with K. F. Kumpf).
- 1938a. Sexual selection among fishes. *Biol. Rev.* 13: 133–158.
- 1938b. The senses involved in the migration of young fresh-water turtles after hatching. *J. Comp. Psychol.* 25(1): 175–193 (1st author, with A. M. Breslau).
- 1938c. Social behavior of the black-crowned night heron. *Auk* 55: 7–40 + pls. 2–4 (1st author, with M. Wurm and A. Schmidt).
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- 1938f. (Abstract) Effect of testosterone propionate on the black-crowned night heron. *Anat. Rec.* 72 (4, Suppl.): 60 (1st author, with M. Wurm).
- 1938g. (Abstract) The social hierarchy in *Xiphophorus* and other fishes. *Bull. Ecol. Soc. Am.* 19(2): 14 (1st author, with Ray Borne).
- 1938h. (Review of) Animals and men: studies in comparative psychology, by David Katz. *Nat. Hist.* 41(2): 152.
- 1938i. (Review of) Genetics and the origin of species, by Theodosius Dobzhansky. *Ibid.*: 154.
- 1938j. (Review of) The human value of biology, by Johan Hjørt. *Ibid.* 41(4): 306.
- 1938k. (Review of) Pavlov and his school. The theory of conditioned reflexes. *Ibid.* 42(1): 78.
- 1938l. (Review of) The origin of life, by A. I. Oparin. *Ibid.* 42(4): 313–314.
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- 1939b. The rôle of dominance in the social life of birds. *Auk* 56: 263–273.
- 1939c. The social behavior of the jewel fish, *Hemichromis bimaculatus* Gill. *Bull. Am. Mus. Nat. Hist.* 76(1): 1–46 + pl. 1 (1st author, with Brian Curtis).
- 1939d. Neural basis of social behavior in vertebrates. *The Collecting Net* 14(6): 121, 123–124. [Reviewed in *Time* 34: 31, September 4, 1939.]
- 1939e. (Abstract) Social behavior and sexual selection of the Florida chameleon. *Bull. Ecol. Soc. Am.* 20(4): 28 (1st author, with B. Greenberg).
- 1939f. (Review of) Quantitative zoology, by George Gaylord Simpson and Anne Rowe. *Nat. Hist.* 44(3): 186.
- 1940a. Egg recognition by the laughing gull. *Auk* 57: 22–43 (1st author, with D. S. Lehrman).
- 1940b. A new species of brevicipitid frog from Madagascar. *Proc. New Engl. Zool. Club* 18: 27–29.
- 1940c. The effect of testosterone propionate on the black-crowned night heron. *Endocrinology* 26(5): 837–850 (1st author, with M. Wurm).
- 1940d. Testosterone propionate, a bisexual hormone in the American chameleon. *Proc. Soc. Exp. Biol. Med.* 44: 460–462 (1st author, with B. Greenberg).
- 1940e. Things to know about reptiles. In G. C.

- Fisher (ed.), The one volume nature encyclopedia: 379–410. New York: Halcyon House. (See also 1921k.)
- 1940f. (Abstract) The effect of hormones on the breeding of the laughing gull. *Anat. Rec.* 78(4, Suppl.): 50–51 (1st author, with M. Wurm).
- 1940g. (Abstract) The effect of sex hormones on the social hierarchy of *Xiphophorus helleri*. *Ibid.*: 147 (1st author, with Ray Borne).
- 1940h. (Abstract) The territorial relations of the laughing gull. *Bull. Ecol. Soc. Am.* 21(4): 38 (1st author, with M. Wurm).
- 1940i. (Review of) A field book of North American snakes, by Raymond L. Ditmars. *Nat. Hist.* 45(1): 58.
- 1940j. (Review of) Inagua, by Gilbert C. Klingel. *Ibid.* 46(4): 250.
- 1941a. Induction of female behavior in male *Anolis carolinensis* with testosterone propionate. *Proc. Soc. Exp. Biol. Med.* 47: 32–37 (1st author, with B. Greenberg).
- 1941b. Effects of seasons, castration and crystalline sex hormones upon the urogenital system and sexual behavior of the lizard (*Anolis carolinensis*). 1. The adult female. *J. Exp. Zool.* 88(3): 451–474 + pls. 1–3 (1st author, with B. Greenberg).
- 1941c. (Editorial) The Museum and Science. *Nat. Hist.* 47(1): 5.
- 1941d. (Abstract) The effect of forebrain lesions on the sexual and fighting behavior of *Betta splendens* and other fishes. *Anat. Rec.* 79(3, Suppl.): 49 (1st author, with Ray Borne).
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- 1942b. Further analysis of the social behavior of the black-crowned night heron. *Auk* 59: 205–224 (1st author, with M. Wurm).
- 1942c. The sexual behavior of Anura 1. The normal mating pattern of *Rana pipiens*. *Bull. Am. Mus. Nat. Hist.* 80(5): 127–142 + pl. 1 (1st author, with Lester R. Aronson).
- 1942d. (Abstract) Neural basis of the sexual behavior in male *Rana pipiens*. *Anat. Rec.* 82(3): 396–397 (2nd author, with Lester R. Aronson).
- 1942e. (Abstract) Dominance, social order and territory in the lizard (*Anolis carolinensis*). *Ibid.* 84(4): 508 (2nd author, with B. Greenberg).
1943. The social behavior of the laughing gull. *Ann. N.Y. Acad. Sci.* 45(5): 179–220 (1st author, with M. Wurm).
1944. Social behavior of the American chameleon (*Anolis carolinensis* Voigt). *Physiol. Zool.* 17(4): 392–439 (2nd author, with B. Greenberg).
1945. The sexual behavior of Anura 2. Neural mechanisms controlling mating in the male leopard frog, *Rana pipiens*. *Bull. Am. Mus. Nat. Hist.* 86(3): 83–140 (2nd author, with Lester R. Aronson).

NOBLE'S AMNH ANNUAL REPORTS

This section includes both the published curator's reports (contained in "Report of the President") plus the lists of accessions (usually separated from the narrative accounts in a different section of the annual report). Noble's own bibliography only listed the curator's reports published in 1921–1929 (for the years 1920–1928), possibly because he wrote less of the subsequent reports (which also were to become abstracted and heavily edited) for which he was administratively responsible. I have added under Noble's name the reports published in 1930–1940. These documents in total give an abbreviated history of collection growth and the development of research during the two decades of Noble's administration.

- 1921l. Existing Reptiles and Amphibians. 52nd Ann. Rept. AMNH 1920: 84–87, 219–221.
- 1922d. Existing Reptiles and Amphibians. 53rd Ann. Rept. AMNH 1921: 75–79, 208–210 + 1 pl. (photographs of Andean marsupial frog).
- 1923p. Existing Reptiles and Amphibians. 54th Ann. Rept. AMNH 1922: 79–86, 212–214 + 1 pl. (photographs of giant tree frog and rhinoceros iguana from departmental fieldwork).
- 1924i. Existing Reptiles and Amphibians. 55th Ann. Rept. AMNH 1923: 106–111, 154–157 + 1 pl. (photograph of a diorama, "Rhinoceros Iguana Group") + [supplementary comments and map of geographic origins of herpetological collections, pp. 4, 6–7, 9, 11–13, 15 + map VI].
- 1925g. Reptiles and Amphibians. 56th Ann. Rept. AMNH 1924: 73–81 + 1 pl.

- (photograph of a diorama, "Gopher Turtle Group").
- 1926n. Reptiles and Amphibians. 57th Ann. Rept. AMNH 1925: 51–54, 101–104 + 1 pl. (photograph of a mount of a Galápagos land iguana, part of a diorama).
- 1927j. Reptiles and Amphibians. 58th Ann. Rept. AMNH 1926: 61–65, 119–122 + 1 pl. (photograph of a giant lizard of Komodo, from Burden East Indian Expedition).
- 1928f. Reptiles and Amphibians. 59th Ann. Rept. AMNH 1927: 60–66, 121–124 + 1 pl. (view of new Hall of Reptiles and Amphibians).
- 1929l. Reptiles, Amphibians and Experimental Biology. 60th Ann. Rept. AMNH 1928: 47–49, 75–78.
- 1930l. Reptiles, Amphibians and Experimental Biology. 61th Ann. Rept. AMNH 1929: 65–67, 103–106.
- 1931j. Herpetology and Experimental Biology. 62th Ann. Rept. AMNH 1930: 26–27, 171–176 + 1 pl. (photograph of salamander and eggs, relevant to "Dr. Noble's experiments . . .").
- 1932m. Herpetology and Experimental Biology. 63rd Ann. Rept. AMNH 1931: 28–29, 172–175.
- 1933i. Herpetology and Experimental Biology. 64rd Ann. Rept. AMNH 1932: 46–48.
- 1934i. [under Research, a few lines on Noble's experimental biology work]. 65th Ann. Rept. AMNH 1933: 10–11.
- 1935n. [under Research, comments on Herpetology and Experimental Biology]. 66th Ann. Rept. AMNH 1934: 17–18.
- 1936m. [under Research, comments on Herpetology and Experimental Biology]. 67th Ann. Rept. AMNH 1935: 11–12, 25–27, 31–32.
- 1937f. Herpetology. 68th Ann. Rept. AMNH 1936: 12, 31, 41, 44.
- 1937g. Experimental Biology. Ibid.: 13, 22–23, 31.
- 1938m. Herpetology. 69th Ann. Rept. AMNH 1937: 14–15, 26–27, 59.
- 1938n. Experimental Biology. Ibid.: 15–16, 27–28, 54.
- 1939g. Herpetology. 70th Ann. Rept. AMNH 1938: 9, 13, 20, 24, 26.
- 1939h. Experimental Biology. Ibid.: 9, 13, 20–21, 24.
- 1940n. Herpetology. 71st Ann. Rept. AMNH 1939: 8, 11, 16, 19.
- 1940o. Experimental Biology. Ibid.: 8, 11, 16, 19.

APPENDIX 4: BIBLIOGRAPHY OF RICHARD G. ZWEIFEL (1926–)

This is the bibliography personally maintained by Curator Emeritus Zweifel, the only additions being his most recent papers and several committee reports (1975d–1975f) that he had not bothered to list. Few formatting changes were necessary for present purposes, and his bipartite arrangement of research and nonresearch titles is maintained here under the headings "Scientific Publications" and "Abstracts, Reviews, and Popular and Other Nontechnical Publications." I added letter designations to papers published in the same year, beginning in the scientific section and continuing in the nonresearch section. The lettering does not necessarily reflect chronology by month of publication.

SCIENTIFIC PUBLICATIONS

- 1949a. Comparison of food habits of *Ensatina eschscholtzii* and *Aneides lugubris*. *Copeia* 1949(4): 285–287.
- 1949b. Ovoviviparity of *Sceloporus jarrovii*. *Herpetologica* 5(6): 152.
1950. Observations on the habits of the ornate box turtle, *Terrapene ornata* (Agassiz). *Nat. Hist. Misc.* 58: 1–4 (2nd author, with Kenneth S. Norris).
1951. Sympatric populations of *Batrachoseps attenuatus* and *Batrachoseps pacificus* in southern California. *Bull. South. California Acad. Sci.* 50(3): 128–135 (2nd author, with Charles H. Lowe).
- 1952a. Notes on the lizards of the Coronados Islands, Baja California, Mexico. *Herpetologica* 8(2): 9–11.
- 1952b. A new species of whiptailed lizard (genus *Cnemidophorus*) from New Mexico. *Bull. Chicago Acad. Sci.* 9(13): 229–247 (2nd author, with Charles H. Lowe).
- 1952c. Pattern variation and evolution of the

- mountain kingsnake, *Lampropeltis zonata*. Copeia, 1952(3): 152–168 + 1 pl.
- 1954a. A new species of *Chersodromus* from Mexico. *Herpetologica* 10(1): 17–19.
- 1954b. A new *Rana* from the Pliocene of California. Copeia, 1954(2): 85–87.
- 1954c. Adaptation to feeding in the snake *Contia tenuis*. Ibid. 1954(4): 299–300.
- 1954d. Notes on the distribution of some reptiles in western Mexico. *Herpetologica* 10(3): 145–149.
- 1954e. A new frog of the genus *Rana* from western Mexico with a key to the Mexican species of the genus. *Bull. South. California Acad. Sci.* 53(3): 131–141.
- 1955a. Contribution to the herpetology of Sonora, Mexico: descriptions of new subspecies of snakes (*Micruroides euryxanthus* and *Lampropeltis getulus*) and miscellaneous collecting notes. *Am. Midl. Nat.* 54(1): 230–249 (1st author, with Kenneth S. Norris).
- 1955b. Ecology, distribution, and systematics of frogs of the *Rana boylei* group. *Univ. California Publ. Zool.* 54(4): 207–292 + pls. 4–10.
- 1956a. Two pelobatid frogs from the Tertiary of North America and their relationships to fossil and Recent forms. *Am. Mus. Novitates* 1762: 45 pp.
- 1956b. Results of the Archbold Expeditions. No. 72. Microhylid frogs from New Guinea, with descriptions of new species. Ibid. 1766: 49 pp.
- 1956c. Notes on microhylid frogs, genus *Cophixalus*, from New Guinea. Ibid. 1785: 8 pp.
- 1956d. A survey of the frogs of the *augusti* group, genus *Eleutherodactylus*. Ibid. 1813: 35 pp.
- “1956” [1957]. The identity of the Mexican lizard, *Cnemidophorus gadovi*. Copeia 1956(4): 260–261.
- 1957a. Studies on the critical thermal maxima of salamanders. *Ecology* 38(1): 64–69.
- 1957b. A new frog of the genus *Rana* from Michoacan, Mexico. Copeia 1957(2): 78–83 + 1 pl.
- 1958a. Results of the Puritan-American Museum Expedition to western Mexico 2. Notes on reptiles and amphibians from the Pacific coastal islands of Baja California. *Am. Mus. Novitates* 1895: 17 pp.
- 1958b. Results of the Archbold Expeditions. No. 78. Frogs of the Papuan hylid genus *Nyctimystes*. Ibid. 1896: 51 pp.
- 1958c. The lizard *Eumeces tetragrammus* in Coahuila, Mexico. *Herpetologica* 14(3): 175 [line 8, paragraph 2, omitted from journal version, is included in the reprint].
- “1958” [1959]. *Cnemidophorus tigris variolosus*, a revived subspecies of whiptail lizard from Mexico. *Southwest. Nat.* 3(1–4): 94–101.
- 1959a. Variation in and distribution of lizards of western Mexico related to *Cnemidophorus sacki*. *Bull. Am. Mus. Nat. Hist.* 117(2): 57–116 + pls. 43–49.
- 1959b. The provenance of reptiles and amphibians collected in western Mexico by J. J. Major. *Am. Mus. Novitates* 1949: 9 pp.
- 1959c. Additions to the herpetofauna of Nayarit, Mexico. Ibid. 1953: 13 pp.
- 1959d. Snakes of the genus *Imantodes* in western Mexico. Ibid. 1961: 18 pp.
- 1959e. Effect of temperature on call of the frog, *Bombina variegata*. Copeia 1959(4): 322–327.
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- 1960d. Results of the 1958–1959 Gilliard New Britain Expedition 3. Notes on the frogs of New Britain. Ibid. 2023: 27 pp.
- 1961a. Relationship of two whiptail lizards (genus *Cnemidophorus*) in western Mexico. Copeia 1961(1): 98–103.
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- 1962a. A synopsis of the lizards of the *sexli-*

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- 1962c. Results of the Archbold Expeditions. No. 83. Frogs of the microhylid genus *Cophixalus* from the mountains of New Guinea. Am. Mus. Novitates 2087: 26 pp.
- 1962d. A systematic review of the microhylid frogs of Australia. Ibid. 2113: 40 pp.
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- 1965a. Revisionary notes on Australian microhylid frogs of the genus *Sphenophryne*. Am. Mus. Novitates 2214: 9 pp.
- 1965b. Distribution and mating calls of the Panamanian toads, *Bufo coccifer* and *B. granulosus*. Copeia 1965(1): 108–110.
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- Text citations included in separate bibliography (appendix 4).

NOTES

Pages 7–13 (*Introduction; Dickerson's Era*)

1. "An act to incorporate the American Museum of Natural History," passed April 6, 1869, State of New York.

2. William Morton Wheeler (1865–1937), best remembered as an ant specialist, was a broad-based biologist who served the American Museum as Curator of Invertebrate Zoology for five years (1903–1908) before accepting a professorship at Harvard, where he spent the rest of his career (see Evans and Evans, 1970). He remained on the American Museum's staff list as Honorary Curator of Social Insects for another decade (1909–1919).

3. AMNH Annual Report for 1905; American Museum Journal, July 1906.

4. At the time of his AMNH-sponsored expedition in 1906, Alexander G. Ruthven (1882–1971) was just on his way to becoming a leading figure in early 20th-century herpetology; it is difficult to overstate his later influence (e.g., see Schmidt [1955: 612], Adler [1989: 74], and Ford and Simmons [1997: 585]). Ruthven's entire career was in association with the University of Michigan, where his successive posts included Director of the Museum of Natural History and, finally, President of the University. In 1941 he conducted a study of the American Museum for the Board of Trustees (AMNH Central Archives, 1121). Although the 42-page "Ruthven Report" makes rather innocuous reading, it was instrumental in forcing the resignation of Director Roy Chapman Andrews in 1941 (see note 131).

5. Mary Cynthia Dickerson was born on March 7, 1866, in Hastings, Michigan, to Wilbur F. and Melissa R. Dickerson. The bare outline of her career can be traced in editions of *Who's Who in America and American Men of Science*, with a few details added from a "necrology report blank" from the University of Michigan, and from information provided by the Registrar, University of Chicago. (Not used is a brief biographical statement in the 1907–1908 *Stanford Register*, which

contains uncorroborated dates and a statement that she had been a high school principal in Sandwich, Illinois.) Some needed flesh was provided by her friend Maud Slye (1923), who is quoted here:

She spent her early life serving the constant needs of three small brothers. From a household where learning was not the tradition, she went through school, never failing in her duties there or in the home . . . She put herself through college at a time when it was not easy for a girl to do this, teaching for a while until she could save money enough to pursue her studies.

Dickerson attended the University of Michigan in 1886–1887 and in 1889–1891, after which she taught high school biology in Grand Rapids, Michigan (Central High School, 1891–1894) and in La Grange, Illinois (1894–1895). She then entered the University of Chicago on September 30, 1895, and was awarded the degree Bachelor of Science in January 1897. The Registrar at the University of Chicago provided the following statement (undated letter to Grace Tilger):

There is nothing in our files to indicate why she came to this institution from the University of Michigan. The academic work completed here for the baccalaureate degree was in a number of fields as required . . . French, English, Latin, Physiology, Zoology. She had been given advanced standing in German, English, French, Chemistry, Physics, Biology, Elocution and Philosophy from the University of Michigan and clearly completed more of her required work there than at the University of Chicago.

Dickerson enrolled as a graduate student in zoology for the winter quarter of 1897 and, in the summer of 1897, worked at Woods Hole as a University of Chicago student. She did not register again after the summer of 1897 or make further progress toward a graduate degree. She was, however, "several summers" at Woods Hole (1894,

1897–1898, 1905–1906, fide *American Men of Science*), where she would have come into a network of influential people who probably were responsible for her move to the University of Chicago and for her later positions at Stanford and the American Museum.

From 1897 to 1905, Dickerson was Head of a “Department of Zoölogy and Botany” (or a “Department of Biology and Nature Study”) at the Rhode Island Normal School, a teachers college, where she taught and gave field trips in botany, zoology, and nature study. According to Slye (1923),

It was during this period of teaching in Providence that she collected the data for [her books and articles for which] she developed her marked ability as an artistic and scientific photographer of insects, amphibians, birds, and flowers in the life. With camera and tramping outfit she would go into the country for week-ends, staying at some isolated farmhouse, in order to take photographs of animals . . . among their native haunts.

After leaving Rhode Island Normal School in May 1905, Dickerson wrote for two years, finishing *The Frog Book* (1906) and the “Pageant of Nature” series for *Country Life in America* (1907). Starting in September 1907, she became “Acting Instructor in Bionomics” (an old term for Ecology) at Stanford University (1907–1908), where she assisted and coauthored three short papers (1908) with ichthyologist David Starr Jordan. After Stanford, the remainder of Dickerson’s professional life was spent at the American Museum of Natural History, where (based on fragments of correspondence) she was twice approached with a job offer from Alexander Ruthven at the University of Michigan (letters, Dickerson to Ruthven, December 24, 1909 [handwritten on AMNH letterhead, photocopy courtesy of K. Adler]; Ruthven to Dickerson, July 13, 1911. AMNH Dept. Herpetology Archives, Dickerson Collection).

Other biographical details prior to 1908 are hard to come by. Slye’s 1923 memorial article provides almost the only published information about Dickerson’s private personality (but see also Noble [1923n] for a brief glimpse). Slye’s article is the unacknowledged source of most of the biographical information in Anderson’s preface to the 1969 reprint edition of *The Frog Book* (Dickerson [1906] in appendix 2).

Maud Slye, who was acknowledged by Dickerson in *The Frog Book*, was a friend from the days of the Rhode Island Normal School, where she had been an instructor (according to Dickerson) or a professor (according to some other sources). Slye went on to a career in cancer research, being recipient of the gold medal of the American Medical Association in 1914, the Rickets prize in 1915, and the gold medal of the North American Radiology Society in 1922 (from *Who Was Who in American History—Science and Technology*, 1976).

Only two authenticated photographs of Dickerson are known (frontispiece and fig. 4), taken by a Fifth Avenue photographic studio in New York. These possibly were taken about 1912 when she was 46 years old, as could be suggested by the following note:

Just a memo Dear Miss Dickerson, about our dept’ photo album, which we talked of at our last staff

meeting. I am sending in a requis. [requisition] for the photographer to make us a set of prints of our negatives, & mount them for us. (Note from Bashford Dean to M. C. Dickerson, written on 3/4 × 5 1/2-inch stationery, March 26, 1912. AMNH Dept. Herpetology Archives, Dickerson Collection.)

6. AMNH payroll records.
7. AMNH Annual Report for 1905.
8. AMNH Annual Report for 1909:

Until lately the reptiles, fishes and batrachians have been cared for by the Department of Invertebrate Zoölogy, but realizing the need of developing this branch of the Museum’s collections, the Trustees created a Department of Ichthyology and Herpetology, which was organized in July and Dr. Bashford Dean of Columbia University, who had been Curator of the Division of Fossil Fishes of the Museum’s Department of Vertebrate Palæontology since 1903, was appointed Curator, Dr. Louis Hussakof, Assistant Curator of Fossil Fishes, Miss Mary C. Dickerson, Assistant on living reptiles and batrachians, and Mr. John Treadwell Nichols, Assistant on living fishes, constitute the staff of the new department.

9. Letter, Director Hermon C. Bumpus to M. C. Dickerson, July 29, 1909. AMNH Central Archives, 777.

10. Dickerson was jointly promoted to Assistant Curator of Herpetology and to Curator of the Department of Woods and Forestry on January 18, 1911 (AMNH Annual Report for 1911). She was promoted to Associate Curator of Herpetology effective May 1, 1913 (AMNH Annual Report for 1913; Natural History, April 1913). She is listed as Curator under Herpetology in the AMNH Annual Report for 1919, in evident anticipation of the separation of Herpetology and Ichthyology in February 1920.

11. The *Journal*’s name was changed to *Natural History* in 1919, effective with volume 19. The reason given was

partly to avoid confusion with other publications known as ‘Museum Journals’ and partly because the magazine for two years had not been restricted to a consideration of the American Museum’s work and interests, but aimed to be a medium of expression between authoritative science in America and the people . . . (AMNH Annual Report for 1919: 139).

Dickerson was the third Editor of the *American Museum Journal*. It had been started by William King Gregory, who served as Managing Editor for volume 1 (1901–1902). Edmund O. Hovey, a Curator in the old Department of Geology and Invertebrate Paleontology, then served as Editor from 1902 until the end of June 1910, by which time Dickerson had trained as Associate Editor for about seven months.

Dickerson’s editorship was distinguished (La Gorce, 1923) but apparently had been intended as a temporary assignment. Museum President Osborn wrote in 1910:

As soon as a competent Assistant Editor can be found, Miss Dickerson will be relieved of this duty, which she has discharged so well, in order that she may give full time to her work under the Department

of Ichthyology and Herpetology. (Letter from Osborn to Acting Director Townsend, December 9, 1910)

Dickerson also edited (and probably authored in part) the Museum's old *Guide Leaflet Series*.

12. Correspondence between M. C. Dickerson and Bashford Dean, 1910–1919. AMNH Dept. Herpetology Archives.

13. Letter, M. C. Dickerson to Acting Director C. H. Townsend, August 5, 1910. AMNH Dept. Herpetology Archives, Dickerson Collection.

14. Stella Risley Clemence (born January 8, 1882) started work as Assistant on September 6, 1910, after graduating from Brown University, and resigned on October 30, 1915. She was paid out of Woods and Forestry according to the AMNH payroll records. She came to Dickerson's aid with stenographic and library skills and a background in biology. She later worked as research assistant for C. Hart Merriam (Fellow of the Smithsonian Institution), dealing mostly with his studies in the fields of western U.S. history, geography, and Indians. After two years (1927–1929) at the American Library in Paris, she joined the Manuscripts Division of the Library of Congress, where she worked until her retirement in 1952. Work she began for Merriam on Spanish manuscripts in the California missions later culminated in an exhaustive study of manuscripts concerning the conquest and colonization of Mexico and Peru (see Clemence, 1932, 1936). She died in Boulder, Colorado, in 1966, at age 84. The preceding bibliographic information is based on newspaper clippings and other materials, including typescript copy from the 1952 *Library of Congress Information Bulletin* (vol. 11, no. 15), in AMNH Dept. Herpetology Archives, Dickerson Collection, Clemence folder.

15. Dickerson's annual report for 1915 acknowledges "250 specimens in a local collection made by Miss Stella R. Clemence at Woods Hole and the Elizabeth Islands."

16. Dickerson's second aide, Arline Field (born December 15, 1889), started work as Assistant on December 21, 1914, and resigned on October 31, 1918. She was paid out of the Department of Publications according to the AMNH payroll record. Later, her married name was Stone (Mrs. F. W.) and she lived in Montclair, New Jersey, from where she wrote an anxious letter (on February 15, 1921) to Museum Executive Secretary Sherwood saying that she had heard of Miss Dickerson's illness (see text, *Miss Dickerson's Tragedy*) and asking where she was and could she do anything to help or comfort her. She remembered Dickerson as "such a brilliant genius and such a generous soul." AMNH Central Archives, 777.

17. Clarence Robert Halter was born on January 16, 1892. There are two payroll cards for him, one showing him working for the Department of Anatomy and Physiology from October 1, 1914, to September 30, 1915, and the second showing him in the Department of Ichthyology and Herpetology from November 2, 1915, into 1917, when he entered military service on December 9. He therefore seems to have been on a different payroll when he collected for Dickerson in the Dominican Republic in the summer of 1915, conceivably with the notion of shared specimens between the two departments.

18. AMNH Annual Report for 1915.

19. AMNH Annual Report for 1919. This was her last annual report (Dickerson, 1920e).

20. Letter, Bashford Dean to Mary Cynthia Dickerson, November 11, 1919. AMNH Dept. Herpetology Archives, Dickerson Collection.

21. Herpetology was first treated as a separate department in the AMNH Annual Report for 1919 (pp. [8], 82n, 210; published May 1, 1920)—in eager anticipation and recognition of the formality that should have been reserved for the 1920 report (annual reporting was still on a calendar-year basis). Clearly the Department *officially* started functioning as an independent entity by early February 1920. The AMNH Annual Report for 1920 (published May 1, 1921) recorded that

At the Annual Meeting of the Board of Trustees, on February 2, 1920, the Department of Ichthyology and Herpetology was separated into the Department of Ichthyology, Associate Curator John T. Nichols in charge; and the Department of Herpetology, Miss M. C. Dickerson in charge.

Prior to about 1901, the names of most "departments" seem to have been used only informally and as needed for reporting purposes. Thus, AMNH Annual Reports for 1884–1900 attributed herpetological acquisitions to a "Zoological Department" (1884) or to a "Department [or "Departments"] of Invertebrate Zoölogy, Fishes and Reptiles" or (even in the same report) "Department of Reptiles, Batrachians and Fishes" (1886–1889), "Department of Herpetology and Ichthyology," or (again in the same reports) "Department of Reptiles and Fishes" (1890–1896), and "Department of Vertebrate Zoölogy" (1897–1900).

The situation was formalized for awhile after 1900. The Department of Invertebrate Zoölogy was officially

established in January, 1901, with Professor Hermon C. Bumpus, as Curator . . . This Department has been given the charge of reptiles, batrachians and fishes, in addition to the invertebrate animals, and the Curator reports that much work has been done in the line of overhauling the large amount of material which had accumulated in the preceding thirty years. (AMNH Annual Report for 1901)

Herpetological acquisitions were thereafter rather explicitly listed under the Department of Invertebrate Zoölogy through 1907. The AMNH Annual Report for 1908 showed a transitional situation, with acquisitions under a Department of Ichthyology and Herpetology but with curatorial and exhibition responsibility being also still attributed to the Department of Invertebrate Zoölogy. Then, in 1909, the Department of Ichthyology and Herpetology came into being (see note 8).

Pages 13–17 (Miss Dickerson's Tragedy)

22. Letter, Mary Cynthia Dickerson to Henry Fowler at Philadelphia Academy of Natural Sciences, March 11, 1919. AMNH Dept. Herpetology Archives, Dickerson Collection.

23. In a letter dated March 1, 1911, to Henry Fairfield Osborn, Dickerson wrote:

My Dear President Osborn: I have just recalled your question of yesterday that perhaps each line of my

work received one-third of my time, and my answer that no doubt that division would hold true in the average. I wish to complete that statement [by] saying that "my time" means all my time, not merely Museum time. The men at the door will tell you that I seldom leave before seven P.M. and I work almost without exception evenings on Museum work. This is not complaint—I wish to work—but simply that you may know the truth of the matter. Yours very sincerely, Mary C. Dickerson.

Osborn's response (letter of March 25, 1911) was that

it will be well to reapportion your salary so that one-third will be charged to Herpetology, one-third to Forestry, and one-third to the Journal.

AMNH Dept. Herpetology Archives, Dickerson Collection.

24. Some of Dickerson's letters are in the Stefánsson Collection in the Dartmouth College Library. Ms. Tilger, who has studied this material more carefully than I have, concluded that there is no evidence of an actual liaison and that Stefánsson was blameless. This also is indicated by his having called the letters to the attention of Museum administration, as recalled by Assistant Secretary Sherwood:

My dear Stefánsson:

Owing to delusions and threats, it has been necessary to send Miss Dickerson to the hospital. Her delusions center around her supposed relations with you. We have done our best to avoid publicity as much as possible, but inasmuch as it was necessary for the authorities to transfer her to Bellevue Hospital, there is no knowing what publicity may occur. I hasten to advise you of this in order that you may be prepared to meet the situation if your name becomes connected with the case.

Have you preserved any of those letters from her which you showed me? If so, I believe it would be very wise to place them in my hands for use in the event that legal steps make it necessary to produce them.

I have shown this letter to [Carl] Akeley and he agrees entirely with me in suggesting this.

Letter from Sherwood to V. Stefánsson c/o Mr. Henry Haskell, *Kansas City Star*, Kansas City, Missouri, November 23, 1920. AMNH Central Archives, 777.

25. Letter, M. C. Dickerson to Henry Fairfield Osborn, June 5, 1920. AMNH Central Archives, 777.

26. Letter, H. F. Osborn to M. C. Dickerson, June 9, 1920. AMNH Central Archives, 777.

27. Letters, M. C. Dickerson to H. F. Osborn, June 12, 1920 (handwritten), and Osborn to Dickerson, July 22, 1920. AMNH Central Archives, 777.

28. Letter, H. F. Osborn to M. C. Dickerson, November 4, 1920. AMNH Central Archives, 777.

29. Letter, Director F. A. Lucas to M. C. Dickerson, November 15, 1920. AMNH Central Archives, 777.

30. Letters, H. F. Osborn to M. C. Dickerson, and Dickerson to Osborn, November 19, 1920. AMNH Central Archives, 777.

31. Letter from Dr. George M. Mackenzie (on Pres-

byterian Hospital stationary) to H. F. Osborn, December 6, 1920. AMNH Central Archives, 777.

32. Telegram from Frank J. Dickerson [Dickerson] to Geo. H. Sherwood, December 8, 1920. AMNH Central Archives, 777.

33. *New York Times*, December 10, 1920, p. 19.

34. Letters, Marcus B. Heyman, M.D. (Superintendent, Manhattan State Hospital on Ward's Island) to Dr. Walter B. James, New York City, May 28 and June 2, 1921, respectively. AMNH Central Archives, 777.

35. Letter, Karl P. Schmidt to Thomas Barbour, August 26, 1921. Courtesy of the Harvard University Archives.

36. Even Thomas Barbour, who had callously used the phrases "bug house" and "should have been in a strait-jacket" in letters to Noble (1919–1920), soon became touched by Dickerson's plight:

Will you also be kind enough to remember what we discussed about Miss Dickerson? We may not be able to do anything and I am pretty short of cash myself, but if I could contribute to her greater comfort, it would certainly give me great pleasure to do so. I shall make some inquiries regarding our Massachusetts institutions and see what it would cost to have her taken care of hereabouts.

Letter, Barbour to K. P. Schmidt, August 25, 1921. AMNH Dept. Herpetology Archives, K. P. Schmidt Collection.

37. Letter, H. F. Osborn to Dr. Charles R. Lambert (presumably at Bloomingdale Asylum), November 26, 1920. AMNH Central Archives, 777.

38. Letter, G. H. Sherwood to Mrs. Alice R. Northrop, January 31, 1922. AMNH Central Archives, 777.

39. Letter from G. H. Sherwood to Mrs. F. T. Stone (née Arline Field, Dickerson's former assistant), February 16, 1921. AMNH Central Archives, 777.

40. Letter, H. F. Osborn to G. H. Sherwood, April 22, 1922. AMNH Central Archives, 777.

41. Letter, H. F. Osborn to Frank K. Sturgis, April 25, 1922. AMNH Central Archives, 777.

42. Letter, H. F. Osborn to Frank K. Sturgis, May 3, 1922, responding to Sturgis's handwritten letter of April 30. AMNH Central Archives, 777.

43. Letter G. K. Noble to Assistant Secretary Sherwood, January 19, 1922. AMNH Dept. Herpetology Archives, Noble Collection.

44. Dickerson's death was attributed to chronic interstitial nephritis of unknown duration (City of New York Standard Certificate of Death no. 10952). She is buried in Oak Hill Cemetery, Grand Rapids, Michigan.

45. The memorial articles for Dickerson are separately cited in the References section and in appendix 3): the authors were John Oliver La Gorce, Associate Editor of *National Geographic Magazine* and Vice President of the National Geographic Society; Barrington Moore, Editor-in-Chief of *Ecology*; Maud Slye, cancer researcher at the Otto S. A. Sprague Institute, University of Chicago; and G. K. Noble, her successor in the department.

46. The fictionalized account of Dickerson's breakdown and of the Department of Herpetology as it was a few years after her departure was published under the title "Susan Aldridge, Requiescat" by Alvah Bessie in a 1966 issue of *American Dialogue*. Author and screen-

writer Bessie (1904–1985)—a member of the “Hollywood 10” jailed in 1950 for contempt of Congress during hearings in 1947 before the infamous House Committee on Un-American Activities—had been a volunteer student and would-be herpetologist in the Department in the early 1920s. Bessie never met Dickerson, and his story, published some 40 years later, contains too much literary license to be taken as a factual document in which only the names have been changed. “Susan Aldridge, Requiescat” is more readily available in a collection of short stories (Bessie, 1982).

Pages 17–32 (Her Legacy, Her Triumvirate, Her Last Vision)

47. Handwritten letter, K. P. Schmidt to M. C. Dickerson, September 19, 1917. Schmidt, writing from the family farm about the effects on Dickerson’s staff of the war and the draft, said

That leaves only Noble of the “Quadrumvirate,” Camp, Dunn, Noble, & myself. For heaven’s sake, don’t let him get excited & enlist. Make him do Herp until he is oblivious to the very existence of a war.

AMNH Dept. Herpetology Archives, Schmidt Collection.

48. The mentioned correspondence between Karl P. Schmidt and Prof. James G. Needham is preserved at Cornell University (in the Rare and Manuscript Collections, Carl A. Kroch Library, #21/23/479 Box 1). Included in that source is an exchange of letters (May 22 and 24, 1917) between Needham and Karl’s father, G[eorge] W[ashington] Schmidt, concerning possibilities of keeping Karl out of the European War. The elder Schmidt alluded to his own arrest near his Wisconsin farm (see text) as an “experience in war-psychology in our own country” and recounted pressure for him to take an indefinite leave of absence from the German Department at Lake Forest College. He reflected that “I am a man of convictions and I suppose I should be willing to suffer for them. But you do not expect your colleagues to heap an outrage upon another.”

Karl P. Schmidt evidently respected his father’s convictions that the war was not a “just cause,” but he seems to have carefully avoided mentioning his father’s unfortunate experience or expressing his own feelings. There is no reference to the matter in Schmidt’s unpublished autobiography (see note 95), prepared some 30 years later.

A little book by A. Gilbert Wright (1967), written for a young audience, provides valuable insights, especially on Schmidt’s childhood and youth. Wright (then Assist. Chief, Office of Exhibits, Natl. Mus. Nat. Hist., Smithsonian Inst.) based his portrait of Schmidt on family sources and personal association, as well as on archival documents from the Field Museum and the American Museum (documents in AMNH Dept. Herpetology Archives, Schmidt Collection).

Some of the inaccuracies in Wright’s book might be due to lapses in oral tradition, but most peculiar is chapter 4, which is mainly devoted to Schmidt’s fieldwork in the Dominican Republic. This is recounted as a two-man expedition (Schmidt and his friend Axel Olsson), with no mention that the expedition was organized and led by a woman (see Maury, 1917). Schmidt stated in his unpublished autobiography that he and Olsson had been

employed by Carlotta Maury and referred to her 1917 report on the expedition, but neither she nor it were mentioned in his own publication (Schmidt, 1921d).

49. Undated (but late 1916 or early 1917 by context), handwritten letter from G. K. Noble to Thomas Barbour. Courtesy of the Harvard University Archives.

50. Letter, K. P. Schmidt to M. C. Dickerson, June 16, 1917. AMNH Dept. Herpetology Archives, Schmidt Collection.

51. Undated telegram from Assistant Arline Field, in response to quoted letter of October 24, 1917, from K. P. Schmidt to M. C. Dickerson. AMNH Dept. Herpetology Archives, Schmidt Collection.

Wright (1967: 65) quoted somewhat different wording for the October telegram, and (on facing p. 64) he also mistakenly said that Schmidt’s job in June had been with the “New York Sanitary Commission” (vs. the N.Y. State Food Supply Commission for Patriotic Agricultural Services [the full name from the printed letterhead of Schmidt’s letter of June 16, 1917, to Dickerson]). Wright must have been writing from faulty memory or incomplete notes concerning these documents; C. M. Bogert had lent the Schmidt–Dickerson correspondence to Wright, who pencilled corrected dates over his initials on several items in the file.

The early letters, those written while Mary C. Dickerson was in charge of the Department, are wonderfully complete and are especially important for what they have to say about that period of Karl’s life, a period that was crucial for his career. (Letter, A. Gilbert Wright to C. M. Bogert, February 17, 1967, in Schmidt Collection, biographical folder.)

52. Letter, M. C. Dickerson to Dr. Nathaniel Lord Britton (Chairman of the Porto [the old spelling] Rico Committee for N.Y. Acad. Sci.), New York Botanical Gardens, July 10, 1919. AMNH Dept. Herpetology Archives, Schmidt Collection, Puerto Rico folder. This folder includes Dickerson’s correspondence concerning the Puerto Rican trip and Schmidt’s frequent reports back to her, and also a letter from him to G. K. Noble.

53. Letters, K. P. Schmidt to Henry W. Fowler, September 23, 1921, and to John Van Denburgh, December 12, 1921. AMNH Dept. Herpetology Archives, Schmidt Collection.

Schmidt was not exaggerating the problem. A year earlier, three days after Dickerson’s first removal from the Museum, Noble had provided the following preliminary damage assessment to the administration (who were reacting to a high-level request from Thomas Barbour for return of specimens):

The Lower California collection of the Museum of Comparative Zoology is sorted out, labelled, and ready to be soldered tight and shipped . . . There are a great many specimens loaned [to Miss Dickerson] by the Brooklyn Museum, National Museum, Philadelphia Academy, University of California, etc., which have had their tin tags removed. I found a number of these tags in empty bottles, draw[er]s, shelves, etc. The return of the tags to their proper specimens can be made only after a careful study of the drawings and photographs at hand. There are no

tagless, dataless Phrynosomas to return to Dr. Barbour.

Letter, G. K. Noble to Assistant Secretary Sherwood, November 22, 1920, in AMNH Dept. Herpetology Archives, Noble Collection, Barbour folder; see also letter to Noble from Director F. A. Lucas, November 22, 1920, in Noble Collection, Lucas folder.

54. Schmidt might have been following tradition or Dickerson's preference, since Dickerson was not acknowledged by him or by Noble in their *Congo* reports. But those were Museum publications, whereas this one was published by the New York Academy of Sciences. Dickerson's magnanimity in including Schmidt's new wife in the budget was rather extraordinary and (at least from my vantage point) would seem to have called for some acknowledgment. In any case, he did make amends for this omission several years after Dickerson's death, in a new account of the Puerto Rican fauna (Schmidt, 1928: 3):

It was my good fortune to conduct the first specifically herpetological field-work for this Survey in the summer of 1919, and for this opportunity I am indebted primarily to Miss Mary C. Dickerson, then Curator of Herpetology at The American Museum of Natural History.

55. K. P. Schmidt was first appointed as a temporary (3-month) Assistant in Herpetology on November 16, 1916 (AMNH payroll records), which was apparently continued until April 1917. He was reappointed as a regular Assistant on October 29, 1917; his subsequent break for eight of months military service and four months personal leave lasted from March 18, 1918, to February 1, 1919, according to correspondence and AMNH payroll records.

He was formally appointed Assistant in the new Department of Herpetology on February 19, 1919 (Natural History, February 1919; AMNH Annual Report for 1919). Schmidt was "promoted from Assistant in Reptiles and Batrachians to Assistant Curator in the Department of Herpetology" on May 19, 1920 (AMNH Annual Report for 1920). He resigned on July 14, 1920, but was reappointed Assistant Curator on April 20, 1921 (AMNH Annual Report for 1921). Schmidt's last resignation was effective July 20, 1922, with vacation allowance to August 20 (AMNH payroll records and formal letters of resignation, Schmidt to Noble, May 1 and May 6, 1922).

56. Roy Chapman Andrews apparently had expected Schmidt to finish the Chinese volume or perhaps at least to coauthor it. In 1930, Schmidt advised Pope on how he thought the work should progress but expressed doubt that he should join in the final effort. In 1931, he told Pope that

You should do the vol *alone*, with such advice as you care to take from me of course, but your name should appear alone on the title page. A little tact may be necessary to disabuse Andrews of the idea that I can or would do the vol . . .

Handwritten letters, K. P. Schmidt to Clifford Pope, September 14, 1930, and January 27, 1931. AMNH Dept. Herpetology Archives, Pope Collection.

57. Gladwyn Kingsley Noble was born in Yonkers, N.Y., on September 20, 1894, to Gilbert Clifford and Elizabeth (Adams) Noble. He was, as stated by Pope (1958a), "the second son and second of six children." The names and ages of the four sons and two younger daughters were listed in the U.S. Census of 1910: Lloyd Adams (age 17). G. Kingsley (15), [J.] Kendrick (14), Stanley R. (4), Constance E. (5), and Vivian (1). G. K. Noble's father, a publisher and seller of textbooks, cofounded the company Noble and Noble Publishers Inc. and also cofounded the still-existing firm of Barnes & Noble. G. Kingsley's three brothers were active with their father in Noble and Noble, which was acquired by Dell Publishing in 1965. His brother J. Kendrick was one of America's early aviators, being U.S. Navy pilot No. 512, after which he shifted to the Marine Corps and flew in World War I combat in France; he "was given Marine Corps wings No. 38 as the 38th man in the corps to become a pilot" (from obituary in *The New York Times*, November 17, 1978).

G. Kingsley Noble's C.V. *circa* 1921 provides the following:

He was educated in the Yonkers Public Schools and in New York Military Academy, later entering Harvard University where he received the degree of A.B. *cum laude* in 1917 and A.M. in 1918. While an undergraduate he won a Harvard College Scholarship and was appointed zoologist to the Harvard Peruvian Expedition of 1916 and [was] leader [of] an expedition [to] Guadalupe [Guadeloupe], F.W.I. (1914), and to Newfoundland (1915). During 1918 he attended the Officer Material School at Cambridge, Mass. and was appointed Ensign, U.S.N.R.F. in October of that year. Since the beginning of 1919 he has pursued graduate studies in the zoological department of Columbia University.

He took his Ph.D. at Columbia University in 1922.

58. Noble's connection with the American Museum went back to childhood, and, like Mary Dickerson, it became virtually his life. As told by his widow, a week after his death,

When Kingsley was a mere toddler, his mother used to bring him to the Museum with his older brother. Often she would lay him down to sleep on a bench, while big brother scampered around. As he grew older, he gradually wormed his way behind the scenes into the offices and the laboratories. Of late years, he often recalled with amusement how very flattered he felt when some members of the scientific staff began to "take him seriously." He never really outgrew his boyhood pride in belonging to the magnificent Museum. Twice he was seriously tempted to go elsewhere and was happy indeed when the Trustees made it practicable for him to carry out his ideas in his own beloved scientific "home." He never regretted his decision and he labored night and day and weekends without cease—not to let the Museum and Experimental Biology down.

For me too, memories of the Museum date back to childhood. Summers, on the beach at Clinton, we used to hear tales of the Museum and of natural history from the lips of dear Mr. Sherwood. Upon leav-

ing college, I was thrilled beyond words to be offered a position in the Department of Education. I was especially thrilled one noon when my eyes wandered across the old Mitla restaurant [see Anonymous, 1910] and rested upon those of Kingsley Noble, whom I had once met at a dance at Wellesley.

Letter, Ruth Noble to Museum Friends, December 15, 1940. AMNH Central Archives, 1186.1.

59. Handwritten letter from G. K. Noble, Cambridge, to M. C. Dickerson, January 5, 1917. This is the first surviving letter between Noble and Dickerson. It and their following correspondence quoted in the text are in AMNH Dept. Herpetology Archives, Dickerson Collection, Noble folder.

60. John Treadwell Nichols (1883–1958): The several letters from Nichols to Thomas Barbour, cited in this section, are 1- to 2-page documents, handwritten on AMNH Department of Ichthyology and Herpetology letterhead, dated December 13, 1916, June 28, 1917, and August 2, 1917. Courtesy of the Harvard University Archives.

These letters, which are supportive of Mary Dickerson's scheme to lure Noble away from Harvard, represent a rare instance of Nichols being involved in Herpetology affairs. For the letter of December 13, 1916, Nichols went to the trouble of "extracting" (copying by hand) the quoted section, obviously for Dickerson's benefit since the extract was saved in her Nichols folder.

Nichols and Dickerson started as assistants together when the Department of Ichthyology and Herpetology was organized in 1909, and Nichols spent the rest of his career at the American Museum. He was internally influential in developing the Museum's fish collections (but seems to have stayed in the background of general Museum affairs) and founded the journal *Copeia* from his Museum office in 1913. The first meeting of the newly organized American Society of Ichthyologists and Herpetologists (ASIH) was held at the American Museum in 1916. In 1923, Nichols turned *Copeia* over to ASIH, which adopted the journal as its official organ, with E. R. Dunn as the new Editor (see *Copeia*, no. 126: 1–2, 1924; also see Berra, 1984, for a chronology of ASIH).

61. Handwritten letter, G. K. Noble to Thomas Barbour, June 21, 1917. Courtesy of the Harvard University Archives.

62. Frank Nelson Blanchard, a student of Ruthven's (see note 4), had just recently arrived at the U.S. National Museum, where Noble may have first met him on November 9, 1919. As reported to Mary Dickerson in a letter dated November 10,

I dropped in at the U.S. Nat. Mus. yesterday. Stejneger was out to lunch but I had a very pleasant chat with Blanchard. The long shelves of unidentified material, the great piles of specimens requiring data, the many jars of uncatalogued things,—were all very bewildering to our friend Blanchard. But his chief embarrassment was the thought that I had found him in a position which I had desired for myself. He tried to explain how there was enough work for two,—a very obvious fact. Still I did not feel justified in disclosing our plans for prussiamatic world dominance.

63. Letter, M. C. Dickerson to Director F. A. Lucas,

February 4, 1919. AMNH Dept. Herpetology Archives, Dickerson Collection, Noble folder.

64. Handwritten letter, G. K. Noble to Thomas Barbour, February 21, 1919. Courtesy of the Harvard University Archives.

65. Noble's (1922) survey of anuran osteology and thigh musculature remains an exceedingly valuable source of data and commentary. About 20 years after Noble's death, I. Griffiths emerged as Noble's main critic based on his own anatomical studies for the doctorate in England. Subsequent workers have tended to take Griffiths' assertions at face value. More recently, however, certain of Noble's anatomical observations disputed by Griffiths have been corroborated, whereas Griffiths' work seems to have been flawed and should be viewed cautiously (see Grant et al., 1997: 31–32).

66. From a report on work in 1919, K. P. Schmidt to M. C. Dickerson (undated), that mentioned "Field work with Mr. Noble, on the pine barren area in New Jersey, at Lakehurst." AMNH Dept. Herpetology Archives, Schmidt Collection.

67. Camp's photograph on page 81 in Adler was provided by C. M. Bogert. It was cropped from a group photograph of Dunn, Camp, and Noble (shown here as fig. 5), but was printed in reverse. Bogert had supplied the date "about 1926," which agrees with the annotation (in his hand) on the negative holder: "Supposedly taken around 1926 in Noble's Lab at the AMNH." But Camp had left the Museum for California by early 1922, and I see no indication in departmental records of a return visit. The period 1920–1921 seems more likely, when Camp was at the Museum and about 26 or 27 years old.

A 1920–1921 (vs. 1926) date for the American Museum photograph also seems suggested by comparison with other pictures of Camp. He appears little older in the Museum photograph (fig. 5) than in his military photograph (fig. 7, ca. 1918). His still youthful looks in figure 5 compare with a noticeably more mature appearance later in California (see Estes [1988: fig. 2] for a photograph taken about 1931–1932). It appears to me that the American Museum photograph must have been taken at least a decade before the California one.

68. The thin folder (about 20 sheets) of correspondence between C. L. Camp and M. C. Dickerson also includes noteworthy interchanges between Dickerson, W. K. Gregory, and G. K. Noble about Camp. There also is a letter (March 7, 1919) from Dickerson to Camp's father, E. W. Camp of Los Angeles, who at that time was an attorney for the Atchison, Topeka & Santa Fe Railway System. AMNH Dept. Herpetology Archives, Dickerson Collection.

69. AMNH Annual Report for 1919.

70. Schmidt resigned effective July 14, 1920, according to AMNH payroll records, although Dickerson (e.g., in the quoted July 14 letter to Director Lucas) and Noble (e.g., in the annual report for 1920 [Noble, 1921]) preferred to consider that Schmidt was on "an extended leave of absence."

71. Letter, M. C. Dickerson to Director F. A. Lucas, July 19, 1920. AMNH Dept. Herpetology Archives, Dickerson Collection, Camp folder.

72. Noble's letter was solicited by Thomas Barbour, who had scribbled an undated note sometime in November 1920 asking Noble to "Give me the dope re Miss

D. Is she shut up in the bug house for good as rumor hath it!" (from AMNH Dept. Herp. Archives, Noble Collection). The original of Noble's handwritten response, dated November 27, 1920, reads in part (Courtesy of the Harvard University Archives):

Rumor travels fast! We have all known that Miss D. was suffering from paranoia for years. The thing has grown and grown until recently it took on an ugly form. The Museum authorities were patient. It was only after Miss D. had acted most indecorously and dangerously that they decided to act. The details—now pretty well known about the Museum—would give me little joy to recount . . . She retains all her intellect . . . as forceful as ever . . . the sad part of it all—she is so near normal that she believes herself the victim of a terrible mistake.

So far as I know, no one put in writing the details alluded to by Noble. By the time of my arrival nearly a half century later, the events were unknown to most Museum staff, and the rare third-hand rumor was uncorroborated and is not worth repeating.

73. Handwritten letter, G. K. Noble to Thomas Barbour (not dated, but contents indicate that it must have been written December 10–11, 1920, being followed by another handwritten letter dated December 12, 1920). Courtesy of the Harvard University Archives.

74. Letter, Barbour to Noble, December 14, 1920, responding to Noble's letters of December 10–11 (probable date; see note 73) and December 12, 1920. AMNH Dept. Herpetology Archives, Noble Collection.

Pages 32–39 (Noble's Era)

75. With regard to G. K. Noble's Museum work history, he

was appointed a research assistant in June [commenced work on July 2, 1917, *vide* AMNH payroll records], and has been carrying on investigations on the Central and South American collections of the Museum. He is at present on leave of absence to complete research begun on Peruvian reptiles at Cambridge. (AMNH Annual Report for 1917)

On his return from the above-mentioned leave, as well as subsequent military service, Noble was promoted to Assistant Curator on February 19, 1919 (Natural History, February 1919; AMNH Annual Report for 1919). He was subsequently promoted from "Assistant Curator, in Charge, to Associate Curator, in Charge, in the Department of Herpetology" in 1922, and to "Curator of the Department of Herpetology" in 1924 (AMNH Annual Reports for 1922 and 1924). In those days, "in charge" and "Curator of" denoted administrative responsibility for which the title "Chairman" has been used since 1942.

76. A tension existed between Noble and William Beebe (1877–1962). Noble told Barbour on December 12, 1920, that he had heard that Beebe was sending a collection to MCZ for identification and that he felt that this reflected badly on himself, although he had Beebe's previous collections half identified. Barbour replied (letter of December 14, 1920) that he knew nothing about it but not to worry, that he would insist that Noble have the opportunity to work it up; Noble (December 20,

1920) replied that his source for the news had been one of Beebe's assistants, Alfred Emerson. Noble's first letter (handwritten) is Courtesy of the Harvard University Archives; other letters are from AMNH Dept. Herpetology Archives, Noble Collection.

A slight tension over Beebe's need for identifications continued into Bogert's era:

Beebe's crediting us with the identifications of his material is a bit annoying, particularly when we never see all of his material. He pesters us occasionally by 'phone, asking us to give him the current name for some reptile, always as though he were working in great haste and virtually frantic . . . We can't pretend to have exhausted the literature when Beebe usually wants his material returned within a day of so. (Letter, C. M. Bogert to Laurence M. Klauber, June 27, 1946. AMNH Dept. Herpetology Archives, Bogert Collection)

See Mitman (1992: 112, 229–230) for brief discussion of unpublished archival sources concerning Beebe's station, including Beebe's opposition to having Alfred Emerson's friend K. P. Schmidt come to the station "just to build up Mary Dickerson's collection." Most of the Beebe herpetological collections, however, were eventually turned over to the AMNH Department of Herpetology.

Rossiter (1982: 209, 212) believed that Beebe was a "naturalist and explorer at the American Museum of Natural History," but (excluding his honorary appointment as a nonsalaried Research Associate in the Dept. Ichthyology) Beebe was associated with the New York Zoological Society throughout his long career.

77. Handwritten letter, G. K. Noble to T. Barbour, April 21, 1921 (Courtesy of the Harvard University Archives). The 1921 correspondence between Schmidt and Noble unfortunately has not survived at the AMNH. Noble's allusions to that correspondence and his arrangement of Schmidt's salary are found in a memo from Noble to Director Lucas, dated April 5, 1921 (AMNH Herpetology Archives, Noble Collection). Schmidt was "reappointed Assistant Curator in the Department of Herpetology" at a meeting of the Executive Committee on April 20, with the appointment taking effect on May 10, 1921 (AMNH Annual Report for 1921).

78. From the Minutes of Board of Trustees Meeting, May 7, 1928:

Resolved, That in accordance with the recommendation of the President and of the Chairman [W. D. Burden] of the Committee on Herpetology, the Trustees hereby approve of changing the name of the Department of Herpetology to the *Department of Herpetology and Experimental Biology* and that Doctor G. Kingsley Noble be designated Curator of the Department—this change to take effect immediately.

79. Thomas Hunt Morgan left Columbia University in 1928 for a position at the California Institute of Technology and later was awarded the 1933 Nobel Prize in Physiology and Medicine. G. K. Noble recognized the offer from Columbia University as

the opportunity of being the successor to the leading experimental zoölogist in the world, of having under my supervision the largest group of graduate biolo-

gists in this city (all working on problems of my choice and interest) and of utilizing in this work the two suites of laboratories occupied by Professor Morgan, as well as his up-to-date green-house.

Letter, G. K. Noble to H. F. Osborn, March 20, 1928. AMNH Dept. Herpetology Archives, Noble Collection.

80. AMNH Annual Report for 1928.

81. Handwritten letter, K. P. Schmidt to G. K. Noble, August 22, 1928. AMNH Dept. Herpetology Archives, Schmidt Collection.

82. The separation of Herpetology from the experimental laboratories occurred formally at the beginning of 1934, when it was

RESOLVED, That . . . The Department of Herpetology and Experimental Biology to be separated into two departments, namely the Department of Herpetology and the Department of Experimental Biology, with Doctor G. Kingsley Noble as Curator of both departments. (Minutes of Annual Meeting of Board of Trustees, January 8, 1934. AMNH Central Archives; also see AMNH Annual Report for 1933)

The name change from Experimental Biology to Animal Behavior took place in 1942, after Noble's death.

83. Letter, G. K. Noble to William K. Gregory (Museum), November 22, 1940. AMNH Dept. Herpetology Archives, Noble Collection.

84. From a Meeting of the General Departmental Committee of the Trustees, April 24, 1935. AMNH Central Archives, 1189.2. This committee replaced the various departmental committees, most of which were abolished in January 1935.

85. From two documents, obviously authored by G. K. Noble, on development needs for the Department of Herpetology (1 page) and the Department of Experimental Biology (4 pages), each bearing the handwritten annotation "about March, 1937." AMNH Central Archives, 1145.1.

86. Letter, G. K. Noble to Frank N. Blanchard, April 24, 1934. AMNH Dept. Herpetology Archives, Noble Collection.

87. Letter, G. K. Noble to Roy Chapman Andrews, January 16, 1937. AMNH Dept. Herpetology Archives, Noble Collection.

88. Noble died in Englewood, New Jersey, seemingly of a streptococcal infection, probably of the throat, although there is some confusion as to whether the infection actually was in the throat (i.e., quinsy) or in the floor of the mouth (Ludwig's angina). The Englewood Health Department declined my request for a copy of the medical certificate of death, based on 1995 state law.

Cause of death was given in a Museum press release (December 9, 1940) and in a *New York Times* obituary (December 10) as "a streptococcus infection of the throat," as also reported by Pope (1958a). Necker (1940), however, said that Noble died of "Ludwig's quinsy," a misnomer for Ludwig's angina. Necker's information was probably obtained secondhand from a Museum source, possibly Bogert, who indicated some uncertainty about the diagnosis in a letter to another colleague:

Mrs. Noble told Mickey [Mrs. Bogert] that he died of Ludwig's Quinsy which Bassler and I looked up

in a medical dictionary to find that it is more properly known as Ludwig's Angina . . . I imagine it was strep, but I do not know this for certain.

In any case, as known to his contemporaries, Noble had problems with his throat for many years, as Bogert continued in the above letter:

Noble had quinsy every winter, and Raven tells me that years ago when Raven, Noble, and Chapin were rooming together, Noble had an operation for quinsy. (Letter, C. M. Bogert to R. B. Cowles, December, 20, 1940. AMNH Dept. Herpetology Archives, Bogert Collection)

Thomas Barbour referred to the problem in 1921:

Dunn tells me that you are back at the Museum. I trust that you are completely recovered from your recent illness. (I do not refer to matrimony but to your throat). (Letter, Barbour to Noble, September 15, 1921, AMNH Dept. Herpetology Archives, Noble Collection)

And in 1922 Noble mentioned to Barbour that he was "going to the hospital . . . for a second operation on that old trouble" (letter, Noble to Barbour, February 14, 1922. AMNH Dept. Herpetology Archives, Noble Collection).

Pages 39–48 (Noble and His Staff)

89. From an "Appreciation from Mr. Douglas Burden read at the Memorial Meeting for Dr. Gladwyn Kingsley Noble," December 19, 1940. AMNH Central Archives, Burden Collection.

90. Letter, Ruth Crosby Noble to Douglas Burden, March 30, 1942. AMNH Central Archives, Burden Collection. Mrs. Noble died in 1988.

91. Letter, Roger Conant, December 3, 1991. Ernest E. Williams, in conversation, 1991.

92. Letter, George S. Myers to C. M. Bogert, December 13, 1940. AMNH Dept. Herpetology Archives, Bogert Collection. Myers may have spoken widely of the beneficial scolding he received from Noble, as the tongue-lashing episode is mentioned also by Walford (1970: 3).

93. Memorandum from Assistant Director Faunce to Director Andrews, October 24, 1934. The summary of votes (on the proposed Saturday closings) given in the memo does not agree with the list of names and votes on an attached page—but the point is made. The idea was not new; the Museum had had a five-day week during the three previous summers. AMNH Central Archives, 1130, uncl.

94. Handwritten letter, K. P. Schmidt to G. K. Noble, November 11, 1930. AMNH Dept. Herpetology Archives, Schmidt Collection.

95. Unpublished autobiography of Karl P. Schmidt, 15 pp. + 5 pp. of "Supplementary Notes." The first part (untitled), is addressed letterlike to "Dear Chuck" (i.e., Charles M. Bogert). This material was mailed to Bogert with Schmidt's handwritten letter dated December 29, 1949, and clearly was prepared in response to Bogert's letter of August 2, 1949. Bogert had asked Schmidt "to assemble a few data that are going to be needed by a couple of your colleagues" in preparation for an un-

specified "attempt to add some additional recognition to your not inconsiderable list of honors."

Bogert abstracted material from Schmidt's autobiography, and presumably mailed this adaptation to some colleague (who is still unknown to me). Bogert much later (September 20, 1965) lent both the carbon of his adaptation and the original of Schmidt's document to Margaret Schmidt, who passed them on to Gilbert Wright for use in writing a book about her husband (Wright, 1967). Subsequently, in a letter dated February 2, 1966, Wright asked Bogert for permission to lend the documents to Carl L. Hubbs, who purportedly was to prepare a memorial article "for the Memoirs of the National Academy of Sciences." The two documents seem never to have been returned to Bogert. However, a copy of Schmidt's autobiography, on file in the archives of the Field Museum of Natural History, was kindly photocopied by Alan Resetar, and it has been reinscribed with the Bogert-Schmidt correspondence (AMNH Dept. Herpetology Archives, Schmidt Collection).

96. Letter, C. M. Bogert to G. S. Myers, January 3, 1941. AMNH Dept. Herpetology Archives, Bogert Collection.

97. E-mail letter, Robert F. Inger to C. W. Myers, November 30, 1998.

98. Letters, G. K. Noble to Karl P. Schmidt, November 2, 1935, and Noble to Emmett Reid Dunn, November 19, 1924. AMNH Dept. Herpetology Archives, Noble Collection, Schmidt and Dunn folders.

Concerning Karl Schmidt's brother Frank, Noble had earlier written (May 17, 1930) to Karl on the possibility of enlisting Frank as "a collector who would be interested in life histories," to accompany Gilbert Klingel on a long trip to the West Indies (see Wreck of the *Basilisk*, under Some Early Department Fieldwork). Karl's responses were enthusiastic (telegram and handwritten letter to Noble, both on May 17, 1930), but Frank declined (letter, Noble to K. P. Schmidt, May 28, 1930).

99. Letter, Emmett Reid Dunn to Thomas Barbour, November 3, [1922] (probable year based on content). Courtesy of the Harvard University Archives.

100. AMNH payroll records show that C. H. Pope started working for Roy Chapman Andrews' Third Asiatic Expedition in June 1921. Pope's salary during 1921-1926 was paid out of Expedition funds, except that half his salary was charged to Herpetology in 1923 and apparently also in 1924 (Dept. Herpetology Annual Budgets).

Noble requested that Pope be added to the Department of Herpetology staff as Assistant Curator beginning in 1926, but, after receiving the 1926 budget, he withdrew the recommendation in protest over low salaries of current staff (letters, G. K. Noble to President Henry Fairfield Osborn, January 14, 1926, and to Acting Director George H. Sherwood, January 21, 1926). Pope was subsequently appointed Assistant in Herpetology at the start of 1927 (Minutes of Board of Trustees Meeting, January 3, 1927) and was promoted to Assistant Curator beginning in 1928 (Minutes of Special Meeting of Board of Trustees, January 9, 1928).

101. I was astonished when I came across copies of *formal Minutes* of Department of Herpetology meetings during Ortenburger's time (1923). I remember thinking that Noble must have been a pretentious sort. But it

turned out that such reports had been demanded by the administration and were discontinued by Noble after a few months. There was a time years later when the Department had to send carbon copies of all correspondence to the Director's office. Such administrative actions amaze and delight one in retrospect, but they are a bit much to live through.

102. In a letter dated June 7, 1922, Ortenburger wrote to Director F. A. Lucas that,

Doctor Noble and I did talk about the matter of living in a large city and it is my opinion that while we shall not like it as well as a smaller place we shall be quite happy in New York.

AMNH payroll records show Ortenburger working from July 1, 1922, through December 31, 1923. In a letter dated December 10, 1923, Director Lucas responded to Noble:

I acknowledge with regret the receipt of Mr. Ortenburger's resignation and shall be sorry to lose him. On the other hand, I am very glad for anything that will offer him a better position.

AMNH Dept. Herpetology Archives, Ortenburger Collection.

103. Note about "William G. Hassler, a new contributor to Natural History . . ." *Natural History* 29(1): 111, January-February 1929.

104. Letters, W. G. Hassler to G. K. Noble, February 11 and May 17, 1937. AMNH Dept. Herpetology Archives, Hassler Collection.

The old title of "staff assistant," first used in 1929, seems equivalent to "scientific assistant" of current usage, whereas "assistant" then became more or less equivalent to today's "technician." The Museum provided salary lines for a few staff assistants in Experimental Biology, but the title apparently was not available to Herpetology, probably for budgetary reasons.

105. Letter, G. K. Noble to Acting Director George H. Sherwood, January 21, 1926, asking for staff salary increases:

Mr. Hassler has been with the Department for several years and is the only person familiar with the location of every specimen. He has carried on his work most faithfully in spite of his meager remuneration. (AMNH Dept. Herpetology Archives, Noble Collection)

106. Letter, William G. Hassler to G. K. Noble, May 17, 1937. AMNH Dept. Herpetology Archives, Hassler Collection.

107. Letter, W. G. Hassler to G. K. Noble, April 5, 1938, written at the start of a 3-week stopover in Haiti, on his way from British Guiana to New York (AMNH Dept. Herpetology Archives, Noble Collection). After leaving Noble's employment, Hassler had participated in the 1937-1938 Terry-Holden Expedition to British Guiana as expedition photographer or cinematographer (e.g., see news note on Terry-Holden Expedition in *Natural History* 40(3): 616, 1937).

108. According to the old AMNH payroll record, Sinitsin was hired on September 30, 1926, under the name Demetrius Theodore Tidy, with date of birth given as

February 23, 1871. The subsequent name change to Sinitsin was recorded without comment. Apparently he was hired as an Assistant in the Library, with no indication of when he transferred to Herpetology. His name is not shown on the Herpetology budget for 1928, suggesting that he may have started in the Department early that year, after budgets had already been submitted. He clearly was working there by that summer and, in September, requested Noble's authorization for vacation from September 26 to October 23. The payroll record shows that he was dismissed on December 31, 1927. His archive folder includes unpublished manuscript material and letters to and from Noble, who corresponded with him about a manuscript (Sinitsin, 1930) up to March 7, 1930. Also, there are a few letters about Sinitsin from Noble to Director Sherwood, one of which (January 10, 1928) appears to refer to the reason for Sinitsin's dismissal 10 days earlier:

Dear Mr. Sherwood:

I find that we have a written statement from Doctor Sinitsin which confirms my statement as to his doing scientific work on the collections during Museum time. The letter is therefore supported by both Doctor Sinitsin's verbal and written statements.

AMNH Dept. Herpetology Archives, Noble Collection, Sinitsin folder.

109. Letter, G. K. Noble to Frank N. Blanchard, probably early January, 1930. Copy in AMNH Dept. Herpetology Archives, Noble Collection, courtesy of Dorothy Blanchard. Ms. Blanchard provided the following information (in letter to Grace Tilger, June 26, 1995):

I am thinking that the undated letter of G. K. Noble . . . may likely have been written in early January of 1930 . . . because on January 14, 1930 my father noted in his diary: "Had to write a long letter to Noble about Burt." I'm guessing that Noble read and then discarded Blanchard's letter, as he wrote that he would do. This letter was probably hand written . . . There are other diary entries . . . concerning Charles and May Burt, and much correspondence with them. These are probably not related to your present concern. Burt's Doctorate examination which "went off very well" was on May 19, 1930.

110. Letter, Noble to Blanchard, May 1, 1930. Copy in AMNH Dept. Herpetology Archives, courtesy of Dorothy Blanchard.

111. Letter, G. K. Noble to Thomas Barbour, May 5, 1930. AMNH Dept. Herpetology Archives, Noble Collection. AMNH payroll records show Burt working from August 1, 1929, through August 31, 1930.

112. According to AMNH payroll records, Carl Frederick Kauffeld was hired as Assistant in Herpetology on September 30, 1930, and resigned on August 11, 1936.

113. The health reason for Snedigar's departure is documented in Department correspondence and was mentioned in his obituary notice in *Copeia* (1964: 256). He lectured at the Hayden Planetarium after returning to the Museum, where C. M. Bogert noted that "His coccidoides infection must have cleared up very successfully during his sojourn in Tucson" (letter from Bogert to Pope, March 11, 1945).

114. Letter, G. K. Noble to Wayne M. Faunce, April

12, 1939. AMNH Dept. Herpetology Archives, Noble Collection.

115. AMNH payroll records and obituary notice for R. Snedigar in *Copeia* 1964(1): 256.

Pages 48–54 (The Pope Affair)

116. Letter (including 3-page summary of Pope's nearly 14 years with AMNH), from C. H. Pope to Vice-Director Wayne M. Faunce, March 20, 1935. AMNH Dept. Herpetology Archives, Pope Collection.

117. Pope was only technically correct, for he had told Noble (letter of March 20, 1931) that he *expected* to receive an unsalaried faculty appointment at Lingnan University, Canton, China (AMNH Dept. Herpetology Archives, Pope Collection).

Pope had actually submitted a formal resignation to take effect October 1, 1931, in order to move to an unsalaried position in China, and his resignation had been accepted at a meeting of the Board of Trustees on May 4, 1931 (AMNH Central Archives, 1186.2). It is not clear why or when he reversed himself or, for that matter, how he had envisioned the economics of such a move.

118. Letter, Roy Chapman Andrews to Clifford H. Pope, October 5, 1932. AMNH Central Archives, 1245.5.

119. Minutes of Annual Meeting of Board of Trustees, January 8, 1934. AMNH Central Archives.

120. Minutes of Special Meeting of the Executive Committee, Board of Trustees, November 26, 1934. AMNH Central Archives.

121. Letter, F. Trubee Davison to Cleveland Dodge, January 31, 1935. AMNH Central Archives, 1130.

122. Mrs. Pope was Sarah Davis, a graduate of Radcliffe College, who had been hired by Noble as replacement for Miss M. E. Jaekle (see Noble, 1926h). In his annual report for 1927, Noble (1928f) gave special credit to Sarah Davis "for her skill in employing the new technique of paraffin infiltration" in preparation of the new Reptile Hall. For coauthored papers, see Noble, 1928d, 1928e, 1929h.

123. Letter, G. K. Noble to Wayne M. Faunce, March 20, 1935. AMNH Dept. Herpetology Archives, Pope Collection.

124. Letter, William K. Gregory to Vice-Director Wayne M. Faunce, March 22, 1935. AMNH Central Archives, 1130 uncl.; also under "Continuation of Mr. Pope's Services," in Minutes of Regular Meeting of the Executive Committee, April 18, 1935.

Gregory, in addition to an adjunct professorship at Columbia University, was at this time, like Noble (his friend and former student), in charge of two Museum departments. See Simpson (1971) for a biographical sketch.

125. Letter, W. K. Gregory to Director Roy Chapman Andrews, July 22, 1935. AMNH Central Archives, 1186.1.

126. Letter, Director Roy Chapman Andrews to Cleveland Dodge, July 25, 1935, and subsequent exchange of letters Dodge to Andrews (July 27) and Andrews to Dodge (July 30). AMNH Central Archives, 1130.

127. Letter, G. K. Noble to Roy Chapman Andrews, November 25, 1935. Herpetology Annual Budgets, in AMNH Dept. Herpetology Archives.

128. Telephone conversation between Inger and Myers, January 4, 1998.

129. From a "Brief Outline of the Functions of Chief Administrative Officers," prepared by Roy Chapman Andrews and Wayne M. Faunce, November 8, 1934. AMNH Central Archives, 1120.

130. It is possible that, about 30 years ago, I was the "assistant curator of amphibians and reptiles," among other young biologists, whom Aronson had found to be ignorant of the Kammerer affair. The story, however, was well-known to Aronson and other of Noble's contemporaries, some of whom speculated that Noble had been distressed by the Kammerer affair and had become distrustful as a result. Dr. Arthur Zitrin, one of Noble's last students (see appendix 3: Noble and Zitrin, 1942b), arrived in the Department of Experimental Biology about 1939, and later reminisced that

Noble had years before exposed the fraud of the Midwife Toad that led to Paul Kammerer's suicide in 1926. Whether Kammerer himself or an overzealous laboratory aide, eager to help his chief, was responsible for the deception is still an unsettled question. One can speculate that the experience made Noble excessively wary of disclosures about the research for which he was responsible. Let me cite an example of the supervisory excess that reflected Noble's concerns. A research assistant once reported to Noble some unusually interesting behavior by a pair of fish she was observing. The next day, however, the behavior was not to be seen and she so told Noble. On the previous evening, as he later admitted to some of us, Noble had replaced one of the fish with a substitute, to test the assistant's veracity.

Beach described Noble as "a highly unusual man, brilliant but emotionally labile." [Koestler's characterization of] Noble as "a ruffian" [was] a slanderous attack in my view. Noble in the lab was stiff and humorless (though friendly and jovial on field trips), but he was certainly not a ruffian. (from the text of "Remarks by Dr. Arthur Zitrin at the Memorial Meeting for Dr. Frank A. Beach, August 31, 1988, Berkeley, California." Copy in AMNH Dept. Herpetology Archives, Noble Collection, Zitrin folder)

131. In 1941, herpetologist Alexander Ruthven, then President of the University of Michigan (see note 4), prepared "A Study of the American Museum of Natural History made for the Board of Trustees" (42 typescript pages, AMNH Central Archives, 1121). Ruthven concluded that the Museum's difficult "problems of finance are only incidental [to a] weak administrative policy," and recommended "changes in personnel and in organization." He did not mention names in the typed report, but in conversation with the trustees Ruthven frankly laid most blame on Director Andrews, who accordingly was asked to resign (see especially Kennedy [1968: 234–237] for discussion and sources; or see Hellman [1968: 183–185] or Preston [1986: 109–110] for sketchy accounts).

A good public face was put on Andrews' departure, as in the following commentary in the *New York Times* on November 12, 1941:

DR. ANDREWS RESIGNS

It is seldom that a man leaves his work because he is in love with it. Yet this is the reason for the resignation of Roy Chapman Andrews as director of the Museum of Natural History. World chaos has narrowed the field of exploration in which he served the Museum for so many years and at the same time forced the institution to deal with new financial problems for the solution of which Dr. Andrews says he is not particularly fitted "either by inclination, temperament or training." So he steps aside to let some one else conserve the results of the period of expansion in which he was the prime mover.

For that period he was the ideal man. In the Asiatic desert, on the ice ridges of the Arctic or along the ocean wastes he developed an unfailing gift for dramatizing his scientific adventures. It was he who brought back the fossil dinosaur eggs, pursued the elusive Dawn Man and tracked down the Baluchitherium, that giant among all prehistoric mammals. He not only made the Museum a vital force in scientific education but brought the public flocking to it, because people found its colorful halls one of the most fascinating vistas in the city scene. For thirty-five years, more than half his life, Dr. Andrews has lived with and for the Museum. It should reassure his successor to know from his letter to the trustees that his talent and enthusiasm will be given freely for the remainder of his life. (Newspaper clipping in AMNH Dept. Herpetology Archives, Noble Collection, Andrews folder)

Pages 54–60 (*Bogert's Era*)

132. AMNH Dept. Herpetology Archives, Bogert and Noble Collections.

133. Letter, G. K. Noble to C. M. Bogert, November 17, 1936. Bogert accepted in writing on November 20. Noble had first offered a position of "temporary assistant" to Howard K. Gloyd, then a doctoral student at the University of Michigan, but Gloyd declined in order to accept a "more permanent position" as Director of the Chicago Academy of Sciences. Letters, Noble to Gloyd, October 14, 1936, and Gloyd to Noble, October 29. AMNH Dept. Herpetology Archives, Noble Collection.

134. Minutes of Meeting of the Executive Committee, Board of Trustees, February 18, 1937. AMNH Central Archives.

135. Letter, G. K. Noble to Director Roy Chapman Andrews, December 13, 1937. AMNH Dept. Herpetology Archives, correspondence associated with 1938 budget request for Experimental Biology.

136. Herpetology annual budgets (1938 is lacking), AMNH Dept. Herpetology Archives. Half of Noble's salary was apportioned to the Herpetology budget until his death in December 1940, although his time clearly was spent mostly in Experimental Biology.

137. In a letter dated May 11, 1942, Bogert mentioned to K. P. Schmidt that "all of our WPA assistance, such as it was, is now a thing of the past as of May 1st." AMNH Dept. Herpetology Archives, Schmidt Collection. The general nature of the WPA help may be gathered from the following description:

The two WPA artists have produced numerous draw-

ings that will serve to illustrate major papers . . . The two laboratory assistants available for shorter periods were employed chiefly to assist in caring for the storage collection. The laboratory assistant still working for the department . . . serves as a general "handy man," caring for live animals, packing and unpacking specimens lent to other institutions, washing jars and similar tasks. (Letter, Bogert to Acting Director Wayne M. Faunce, November 21, 1941. AMNH Dept. Herpetology Archives, correspondence associated with 1942 budget request)

This useful help came not without cost, however, since there was a large bureaucracy and substantial red tape. For example, on September 20, 1938, Bogert heard from the Manager of the Audit Department (Division of Finance, WPA for the City of New York), in regard to Case No. 1279, that the Survey Board had determined that he was responsible for the loss of a Crow Bar valued at 30 cents, which he should remit promptly to the Treasurer of the United States.

138. Letter, C. M. Bogert to Acting Director Wayne M. Faunce, January 9, 1942. AMNH Dept. Herpetology Archives, correspondence associated with 1942 budget request.

139. Letter, Acting Director Wayne M. Faunce to J. A. Oliver, March 27, 1942. AMNH Dept. Herpetology Archives, Oliver Collection.

140. Letter, G. G. Simpson to Director Albert E. Parr, June 30, 1942. AMNH Central Archives, 1186.1, uncl.

141. AMNH Annual Report for 1942.

142. Letter, Edwin H. Colbert to Director Albert E. Parr, on accepting Parr's offer of the chairmanship of a renamed "Department of Amphibians and Reptiles" that would include the paleontological collections, June 30, 1942. AMNH Central Archives, 1186.1, uncl.

143. AMNH Annual Report for 1944. After being parted from paleontology, the name "Department of Amphibians and Reptiles" was retained from 1944 until 1959, when it again became "Department of Herpetology." The AMNH Annual Report for 1959–1960 included the Chairman's report under Department of Amphibians and Reptiles, but listed the staff under Herpetology. The reason for these name changes (paralleled in other departments) was not discussed, and the Department of Herpetology remained nomenclaturally stable until 1987 (see note 152).

144. Letter, R. G. Zweifel to C. W. Myers, October 11, 1998. AMNH Dept. Herpetology Archives, Myers Collection.

145. "The American Museum of Natural History, Confidential Report and Recommendations, from the Director [Albert E. Parr]," 46-page mimeographed report in blue cover, dated April 1944 (presumably prepared for the trustees, although the intended audience is not indicated). The material quoted is from page 29.

This seems to be a rare document. I retrieved a copy years ago from a pile of material being discarded. That copy has been placed in the AMNH Central Archives (Manuscript Collections, Albert Parr Collection); a xerographic copy has been placed in the AMNH Dept. Herpetology Archives (Bogert Collection, Parr folder).

146. Letter, C. M. Bogert to Clifford Pope, January 25, 1947. AMNH Dept. Herpetology Archives, Pope Collection.

147. The "irreducible minimum" was discussed by departmental chairmen, who eventually gave the Director a vote of confidence on this matter. Council of the Scientific Staff, Minutes, June 7 and October 4, 1948.

148. Letters, James A. Oliver to Director Albert E. Parr, April 20, 1948, and Parr to Oliver, April 28, 1948. AMNH Central Archives, 1186.1.

149. According to a memorandum sent to Dickerson from the office of the Assistant Secretary, the position of Research Associate was created "at the meeting of the Executive Committee, held October 20, 1915" (AMNH Dept. Herpetology Archives; also see AMNH Annual Report for 1915).

Research Associates did not contribute significantly to growth of the Herpetology collection before Bogert's appointments, with two significant exceptions—Harvey Bassler and William Douglas Burden, both appointed during Noble's time. Bassler brought in a remarkable collection from the upper Amazon. Burden, a Museum trustee and important backer of Noble's expansionist plans, conducted a 1926 expedition to the Dutch East Indies.

Pages 60–63 (Zweifel and Successors)

150. Dickerson, Schmidt, and Noble worked together for a longer time, but Schmidt was not promoted to a curatorial position until 1920.

151. Sometime in the mid-1980s, Director Nicholson told me over coffee that he would like to combine Herpetology and Ichthyology similar to his earlier merger of the departments of Invertebrate Paleontology and Living Invertebrates. He thought that roughly six curators per zoology department was a good goal. Stopping my protest, he assured that he would not take such action unless he could put us in the same or adjacent quarters for administrative efficiency. He made that decision later, when, envisioning retirement, he optimistically thought that he had laid plans that would commit a new administration to an expensive renovation of the old Power House for an alcohol storage facility, which would accommodate both departments and some other, smaller alcohol-preserved collections.

Nicholson was capable of changing his mind. He admitted that "Time will tell whether I am right or not, but it deserves a try, and it is reversible" (letter, Nicholson to Myers, May 15, 1987. AMNH Dept. Herpetology Archives, Myers Collection). But the merger proved easier to do than to undo.

Despite this and a few other disagreements, I personally regard Thomas D. Nicholson (1922–1991) as having been a good administrator and the Museum's most effective director in modern times. He retired in June 1989 and died a few years later, on July 9, 1991.

152. The old Department of Ichthyology and Herpetology had been divided in 1920, but, to come full circle, the separate departments of Herpetology and Ichthyology were recombined effective July 1, 1987, with the expectation (later abandoned) that they would be physically combined in new quarters for alcohol-preserved collections (see note 151). This was only the latest of several name changes and departmental realignments experienced by Herpetology and other departments in the American Museum, as detailed for Herpetology in notes 21, 78, 82, 142, and 143. Herpetology and Ichthyology were again separated as of July 1, 1997.

During 1922–1930, President Osborn also had the Museum's scientific departments grouped under three "divisions," each headed by a "Curator-in-Chief": (I) Division of Mineralogy, Geology, and Geography, which included Paleontology and later Astronomy; (II) Division of Zoology and Zoogeography; and (III) Division of Anthropology. This seems to have been ineffectual and was discontinued by Osborn himself.

Realignment of departments by administrative fiat clearly has resulted in stronger departments when disciplines have been separated one from another, as for example when Ornithology and Mammalogy were split, or when Herpetology and Ichthyology were separated. Loss of autonomy, on the other hand, can just as clearly slow the momentum of any discipline-oriented, collection-based department, whereas even an understaffed autonomous department can progress if it has the attention of a curator vested with reasonable authority. Herpetology lost momentum when resources and attention were shifted to Experimental Biology (see text under Noble), but the Department subsequently held and even gained ground when it was controlled by a single, dedicated curator (see text under Bogert), even though the economic and staffing conditions were appalling in the last example.

Interestingly, of various biology departments established in the Museum over the years (including defunct Anatomy, Animal Behavior, Conservation and General Ecology, Physiology, and Public Health), only the taxonomically oriented, collection-based departments have survived in the long run. The taxonomic departments also have tended to sort themselves out from various administrative reshufflings. The reasons for this may not be as evident as I first thought, and it might be useful to critically examine the process across several administrations.

ADDED IN PRESS, SEPTEMBER 1999: Apropos of the last sentence, it should be recorded that, in January 1999, plans were announced for the latest (but probably not the last) reorganization of the scientific staff (memo to all curators from Provost Michael Novacek, dated December 9, 1998, but not distributed until January [Minutes of the Senate of the Scientific Staff, January 4, 1999]). Effective July 1, 1999, the scientific departments were merged among five divisions: Anthropology (no practical change); Invertebrate Zoology (the former departments of Entomology and part of Invertebrates were fused); Paleontology (the former departments of Vertebrate Paleontology and part of Invertebrates were fused); Physical Sciences (including the separate departments of Astrophysics, and Earth and Planetary Sciences); and Vertebrate Zoology (composed of the still-discrete departments of Herpetology, Ichthyology, Mammalogy, and Ornithology).

Most of the curators, especially those in the zoology departments, appear to have been unconvinced by rationale given for the changes, which were made in unawareness of Osborn's ineffective divisional scheme of 1922–1930 (see above). The curators' dissatisfaction with alleged secrecy involved in the planning led to a vote of no confidence in the Chair of the Senate (Minutes of the Senate of the Scientific Staff, April 5, 1999)—an action seemingly unparalleled in the long his-

tory of the Council of the Scientific Staff and its Senate successor.

Each new division is headed by a Divisional Chair, with departmental chairs being abolished and replaced (in some cases) by "curators-in-charge" (fide AMNH Directory to Scientific and Management Staff, July 1, 1999 [distributed in September]). It will be interesting to see if curators-in-charge will be able to lead their discipline-oriented units with energy and innovation, or if diminished authority leads to loss of momentum as sometimes happened in the past.

153. Letters, C. W. Myers to Michael J. Novacek, April 2, 1993, and Novacek to Myers, April 5, 1993. AMNH Dept. Herpetology Archives, Myers Collection.

154. History of Department of Herpetology facility and equipment grants from the National Science Foundation: (1) 1975–1979, NSF DEB 72-00062, Support of Systematic Collections in Herpetology (R. G. Zweifel, Principal Investigator [PI]), \$180,279. (2) 1980–1983, NSF DEB 80-10672, Systematic Collections in Herpetology (R. G. Zweifel, PI), \$224,622. (3) 1983–1986, NSF BSR 80-10672, Completion of the Herpetological Collection and Visitor Facilities (C. W. Myers, PI), \$142,488. (4) 1984, NSF BSR 84-00372, Bioacoustical Equipment for Systematic Herpetology and Ornithology (C. W. Myers, PI; W. E. Lanyon, L. L. Short, and R. G. Zweifel, co-PIs), \$55,648. (5) 1992–1995, NSF DEB 91-23755, Computerization of the Database and Invoicing Systems of the Herpetology Collection (C. W. Myers, PI), \$285,000. (6) 1993, NSF supplement to DEB 91-23755, Establishment of Internet Service to Science Departments at AMNH (C. W. Myers, PI [proposal prepared by W. K. Barnett]), \$20,376.

155. The proposal and approval of the new position are traced in museum memoranda: Myers to Director W. J. Moynihan, June 12, 1992; Myers to Budget Director Leslie Brown, April 7, 1993; Myers to Provost Michael J. Novacek, April 13, 1995; Novacek to Deputy Director for Administration Charles A. Weaver, Jr., May 12, 1995. AMNH Dept. Herpetology Archives, Myers Collection.

Curatorial Associate Linda S. Ford (Ph.D., Univ. Kansas, 1989) had served as Project Manager for computerization of the specimen database and invoicing systems. Her connection with the Museum started as a participating student (NSF funding) in the 1984 Expedition to Cerro de la Neblina and continued with a 2-year postdoctoral fellowship during 1990–1992. She was salaried from the NSF computerization grant during 1992–1995.

Pages 63–94 (A Century of Exhibition)

156. In report by J. B. Holder, Curator of the Department of Invertebrate Zoology, Fishes and Reptiles. AMNH Annual Report for 1887–1888.

157. AMNH Annual Report for 1900.

158. A handwritten preparators' report for the "Department of Herpetology" for late 1909 through 1910 (filed with the department's annual report for 1910) credits Dickerson with having cast some 20 specimens in wax. Preparators listed in the report include names frequently mentioned by Dickerson in subsequent annual reports and in the American Museum Journal—Dwight Franklin and Thomas Bleakney for wax casting and painting, respectively, F. Blaschkne for modeling directly in clay for casting in plaster, G. C. Bell for difficult

piece molds, and Mr. Patch for making "plant accessories."

159. Dickerson's contact in Orlando, Florida, was A. M. Nicholson, a professional collector and taxidermist, who served as guide and who helped obtain animals and plant accessories. In May 1915, Dickerson sent Museum Preparator Walter Escherisch to work with Nicholson; Escherisch prepared an 8-page typescript account of the countryside and a list of amphibians and reptiles, with natural history notes. Dickerson made two quick trips herself in April and September 1916. AMNH Dept. Herpetology Archives, Dickerson Collection, Escherisch and Nicholson folders.

160. Letter, M. C. Dickerson to Thomas Barbour, May 9, 1916. AMNH Dept. Herpetology Archives, Dickerson Collection.

161. Letter, H. F. Osborn to M. C. Dickerson, November 4, 1920 (AMNH Central Archives, 777). The two designations "southeast wing" and "east wing" were at various times used both for building 3 and the later building 9; see figure 17.

162. By "southwest," Noble probably meant to say a "southeast" wing then under construction. This new wing would later more appropriately be called the "east wing," and Museum *General Guides* (e.g., 1939) would label the former east wing (which housed the first herpetology exhibits) as the "southeast wing." Thus, the first herpetology exhibits were in an east wing (building 3), and the 1927 (and 1977) exhibits were (are) in a *different* east wing (building 9). This newer wing is the one that faces on Central Park West and that connects the Theodore Roosevelt Memorial with the eastern corner of the 77th Street façade. See figure 17.

It somehow pleases me that curators of the 1920s could be as disoriented in the Museum as some present-day ones. In trying to explain something to me at staff coffee, Director Thomas Nicholson once took a pencil in desperation and drew an outline of the entire Museum complex on a paper napkin—with all 20 or so buildings shown in rough proportion. Directors learn to do this sort of thing.

163. Dickerson had obtained two living *Sphenodon* that had come "via the Panama Pacific Exposition, through the courtesy of the Minister for Internal Affairs at Wellington," and by early 1916 she was seeking extensive accessory materials and detailed information for a habitat group. She intended to show the *Sphenodon*-bird association, since she also wanted "Skins of petrels for mounting (the species that lives with Tuataras in the nests)." Letter, M. C. Dickerson to Director, Auckland Museum, February 24, 1916. AMNH Dept. Herpetology Archives, Dickerson Collection, Collectors & Collections, VI.

164. Letter, G. K. Noble to Director George H. Sherwood, December 21, 1931. AMNH Dept. Herpetology Archives, Noble Collection. In this letter, Noble was concerned that someone else might patent the details of the paraffin-infiltration system and interfere with its use in the Museum.

165. By about 1930 or 1931, Noble was envisioning a "Hall of Biology" that would paint in very broad strokes; for example,

There is present in the Museum exhibits of the migration of butterflies, salamanders and birds but the

recent important discoveries of the relation of hormones and daylight to migration must be withheld from the public . . . The great chemical bonds of life such as the nitrogen and carbon cycles should mean much more to the high school student than a text book figure . . . Our habitat groups show many of the habits of animals but we are in need of an exhibit showing the machinery of the mind. The fundamental difference between a reflex and associational mind should not be lost sight of when comparing mammals, birds, and fish . . . Many recent discoveries in the natural sciences including the fields of genetics and physiology receive at present no demonstration in the Museum. It is hoped that a new Hall of Biology will be made available to fill this need.

Noble was able to accomplish some of his goals when he took over responsibility for the old Hall of Public Health. But his vision was simultaneously sharpened over the next several years to focus on a possible Hall of Animal Behavior. An incomplete exhibit—"Some Suggestions for a Future Hall of Animal Behavior"—was shown at an annual Member's day reception in June 1937. A review in the *New York World-Telegram* (Wednesday, June 9, 1937) could not use enough headings and subheadings:

Museum Visitors Can See As Fish Do.

New Gadgets Also Let Them

View a Colorless World as

It Appears to Dog.

Henpecking is Explained.

How You See the Barnyard—How It Looks to the Chicken.

How a Pond Looks to a Turtle.

In the annual report for 1938,

The Hall of Animal Behavior, not yet open to the public, was available to special groups of visitors. Living specimens were brought from the laboratories to supplement the exhibits.

Another "preview of the contemplated Hall of Animal Behavior" was held in December 1939, according to the annual report for that year. Significant exhibits were installed in "the temporary Hall of Animal Behavior" in 1938, 1939, 1940 (the year of Noble's death), and 1941, including a microvivarium:

A large microprojection booth recently installed offers for the first time in any museum an opportunity for study of the micro-organisms living in a drop of water. Five microscopes project upon separate screens greatly enlarged images of living unicellular animals, such as the amoeba, euglena, and paramecium.

Much of this work was accomplished with WPA help, but that help ended and many of the mechanical and cinematic exhibits were labor intensive, requiring frequent attention. Despite their popularity, these exhibits would have been too expensive to maintain through the fiscally difficult times ahead, particularly in the absence of Noble's persuasive presence. The preceding materials are from AMNH Dept. Herpetology Archives, Noble

Collection (Exhibit Halls—Animal Behavior), and AMNH Annual Reports for 1935–1941.

166. The Hall of Animal Behavior was still called “temporary” in the annual report for 1941, when new exhibits were listed among the advances in the Department of Experimental Biology that had been “all achieved under his [Noble’s] brilliant leadership.” Substantial exhibits were installed in 1942, but, without Noble and in the face of deteriorating financing and staffing during World War II, the Hall faded into oblivion. It ceased being mentioned in the published annual reports and I do not know when it was finally dismantled (but I have not examined the annual archival reports for Experimental Biology—Animal Behavior).

167. AMNH Annual Report for 1926.

168. “Outline of Plans for a New Hall of Amphibians and Reptiles,” [by C. M. Bogert and R. G. Zweifel, 1964], 53 typescript pages. AMNH Dept. Herpetology Archives, Administration, Exhibit Hall IVB1.

169. AMNH Dept. Herpetology Archives, Department Administrative, current (1977) Hall folders 1–22.

170. An 11-page photographic record of the “Mountain of the Mist” gallery exhibit is preserved as appendix 7 in Dept. Herpetology Annual Report (Archival) for 1984–1985. The exhibit also travelled to Caracas.

171. Michael J. Klemens (Ph.D., Univ. Kent at Canterbury, 1990) started Museum employment in 1979 as Scientific Assistant in Herpetology. In 1990 he became Director of the Turtle Conservation Program, which was headquartered in the Department of Herpetology as a joint initiative of AMNH and the World Conservation Union’s Species Survival Commission (IUCN/SSC). This program was the precursor of the Museum’s Center for Biodiversity and Conservation, for which Klemens served as Special Projects Director before leaving the Museum in 1994 for the Wildlife Conservation Society.

Pages 94–110 (Curation and Collection Growth)

172. Letter, Director Frederic A. Lucas to G. K. Noble, December 16, 1920. Overall, this was a sympathetic letter in response to Noble’s first budget preparation. Weeks earlier, on November 22, 1920, Lucas had instructed Noble as follows: “In the absence of Miss Dickerson, will you kindly take charge of all matters pertaining to the Department of Herpetology?” AMNH Dept. Herpetology Archives, Noble Collection.

173. By 1927, the Boulengerian system at the California Academy of Sciences had been modified so that species were arranged alphabetically within genera, which were still shelved systematically (Slevin, 1927: 251). Drs. Kraig Adler and George Zug told me that parts of the Michigan collection were still arranged according to Boulenger when they arrived there as students. After the death of Norman Hartweg in 1964, Adler and Zug, as temporary curators, rearranged the lizard and snake collection.

174. The archival report for 1930 simply stated that the study collections were “rearranged on a more convenient system,” but in an earlier letter to Thomas Barbour (November 18, 1929), Noble wrote that “We are installing a new system of arranging our material, the species being filed alphabetically [which had been done or started in 1918] under the genus, and the latter alphabetically under the family.”

175. Memo, Assistant Arline Field to M. C. Dickerson,

May 7, 1918. AMNH Dept. Herpetology Archives, Dickerson Collection.

176. Monel is a trademark name for a metal alloy produced by direct reduction from ore in which the constituent metals occur in proportions of about 67% nickel, 28% copper, and 5% of other metals, including iron and manganese.

177. Letter, C. M. Bogert to C. W. Myers, April 15, 1987. AMNH Dept. Herpetology Archives, Myers Collection.

178. Assistant’s report to M. C. Dickerson for 1917, bound with departmental archival copy of AMNH Dept. Herpetology Annual Report for 1917.

179. Quoted material condensed from several pages of memos by assistants Arline Field and Madolin C. Barnett, bound with archival draft of Dept. Herpetology Annual Report for 1918.

180. Charles W. Myers and George W. Foley, 1987, “Herpetology collections, American Museum of Natural History. collection Policies and curatorial procedures.” Preserved as Appendix VI to Dept. Herpetology Archival Report for 1986–1987. Revised 1989. Subsequent revisions by Linda S. Ford.

181. Letter, M. C. Dickerson to Mr. R.D.O. Johnson, Quibdo, Colombia, South America, November 1, 1920. AMNH Dept. Herpetology Archives, Dickerson Collection.

182. Submitted by Arline Field and Madolin C. Barnett to M. C. Dickerson with Herpetology Archival Report for 1918.

183. Letter, M. C. Dickerson to Scoutmaster, Boy Scouts of America, New York City, May 2, 1919. AMNH Dept. Herpetology Archives, Dickerson Collection, Collectors & Collections V.

184. Letter, G. K. Noble to Mr. W. A. Ashley, Editor of *Scouting*, Boy Scouts of America, New York City, January 17, 1922. Mr. Ashley responded positively and published a notice titled “A Salamander Hike” in the March issue of *Scouting*. Although heavily edited and paraphrased, it clearly was prepared directly from Noble’s text and therefore has been added to his bibliography (Noble, 1922f). One inserted parenthetical phrase about giving specimens also to “the nearest museum to you” definitely was not Noble’s idea! A Mr. F. Martin Brown of the Boy Scout Museum supplied Noble with a short list of enthusiastic collectors to whom Noble sent sheets of instructions in early 1922. Dept. Herpetology Archives, Noble Collection, Boy Scouts.

185. Dating and authorship of the AMNH Herpetology collecting leaflets, numbered as in text (material not otherwise referenced is in AMNH Dept. Herpetology Archives, Noble Collection, Collectors & Collections IV—Guidelines).

1. The first leaflet, one page on a single quarto sheet, was mentioned on May 17, 1919, in a letter from Karl P. Schmidt to William Beebe (quoted, p. 108) and most likely was printed earlier that same year, since “Department of Herpetology” is a prominent part of the title (anticipating the formal separation from Ichthyology in 1920). This is the earliest of the documents listed; what seems to be the penultimate typescript draft has survived (differences are very minor).

The only surviving copy of the printed leaflet itself has additional suggestions (compiled by K. P. Schmidt,

see below) added by typewriter on the reverse side, presumably for distribution. Both G. K. Noble and K. P. Schmidt were qualified to write the leaflet (although Noble was the most experienced), and they probably collaborated, since it was a matter of general departmental interest. It would have had Mary Dickerson's approval to have been printed at Museum expense.

2. This 4-page (octavo) Collector's Leaflet No. 2 is essentially identical to the preceding except for virtually word-for-word incorporation of the aforesaid material typed on the back of a copy of the first leaflet. K. P. Schmidt evidently compiled the additional suggestions, presumably with Noble's knowledge and advice. Schmidt's report of work for the year 1921 (included with vol. 1 of the bound Dept. Herpetology Archival Reports) stated that "Notes have been accumulated for some time for additions to the sheet of directions for collectors, and the manuscript for a new edition of this has been prepared." This leaflet was dated 1921 in one of Noble's typescript bibliographies although, based on correspondence quoted under no. 3 below, 1922 seems more probable.

3. The Collector's Leaflet No. 3 for collecting salamanders was written by G. K. Noble, evidently with advice from E. R. Dunn, in an attempt to involve the Boy Scouts in making a survey of the salamanders of the United States (see text). Dunn's involvement is hinted at in the following extract of a letter from Noble: "I enclose a copy of the 'suggestions' which you and I worked out together. If you want any additional copies, I shall be very glad to send them to you (letter, Noble to Dunn, November 6, 1922).

There was no official "Collector's Leaflet" No. 1 for amphibians or reptiles; the numbering scheme for the Museum's collecting leaflet series was settled in early 1922 between Noble and Director F. A. Lucas; the publication date of 1922 is assumed for items 2 and 3 based on their correspondence:

[Lucas to Noble, January 14, 1922]: Shall we call the little circulars giving directions for collecting various classes of objects "Collectors Leaflets"? Directions for mammal skins would be No. 1, Reptiles No. 2, Amphibians No. 3 and so on.

[Noble to Lucas, January 16, 1922]: In regard to the "Collectors' Leaflets," the name seems very appropriate. Leaflet No. 2 [3] should be suggestions for collecting salamanders only, since the text does not apply to frogs. The latter are included in the general "Suggestions to Collectors of Reptiles and Amphibians" [= No. 2]. The idea in splitting these up is to simplify matters since salamander collecting is a rather specialized procedure.

4. A handwritten note dated February 11, 1937, from one of Noble's assistants, and associated with an original 8-page typescript, reads: "Dr. Noble. If you approve of this form (by Mr. Bogert) I'll have it re-typed & sent to printer." Noble scrawled on the back, "Let me see the old one for comparison." Bogert, only a few months on the job, seems to have attempted a complete rewrite of the "Suggestions" pamphlet, but, to the best of my knowledge, his rather wordy revision was never printed.

Presumably Noble wanted to keep the original script in Collector's Leaflet no. 2, which is incorporated vir-

tually word for word in the present version. Two things seem to be rewritten and added from Bogert's typescript, namely the well-known technique of snaring lizards with a noose and the newer concept of highway collecting. The recommendation that a crowbar is useful in rocky areas, although not in his typescript, might also have been added because of Bogert's western experience.

Noble wrote a brief preface (quoted in text under Collecting Leaflets and Other Propaganda) and added, or allowed to be added, the additional collecting techniques provided by Bogert, so joint authorship can be attributed to this revision of leaflet no. 2.

It is a document of seven printed pages (front and back side of cover plus five pages of suggestions; outside of back cover is blank). One surviving copy is known, found in one of the binders of Noble's reprints, with a penciled "1937" on the bottom of the front cover. Whoever inserted this in the binder penciled "22a" in the upper corner, thus confusing it with the salamander leaflet that was so numbered as an insert in one of Noble's typescript bibliographies. But the penciled "1937" fits in with the dated note about Bogert's typescript and seems reasonable except for one complication: C. M. Bogert, in his archival annual report for 1940, wrote that the "collector's leaflet was revised and reprinted during the year." Therefore, the year of publication is either 1937 or 1940, or else I lack knowledge of another version.

5. Item no. 5 is nearly identical to no. 4 above. About the only revisions were to change the cover insignia, to drop Noble's initials from the preface, and to change the name of the Department (from Herpetology to Amphibians and Reptiles) in the shipping address. Type was reset, causing a partial page of suggestions to flow onto the outside of the back cover, giving eight printed pages. It must have been published between the years 1942 and 1959, the only period in which the name "Department of Amphibians and Reptiles" was used. Bogert was the only curator for most of this period and was probably responsible for the editing.

6. Preparation of the "Supplement" was mentioned in the Herpetology Archival Report for Fiscal Year 1962–1963 as "the most economical means of revising the leaflet," and it is further dated by a penciled "1963" on one copy. It was written by R. G. Zweifel (personal commun.)

186. Letter, M. C. Dickerson to Alexander Ruthven, June 22, 1915. AMNH Dept. Herpetology Archives, Dickerson Collection.

187. Letter, Assistant Arline Field to William Beebe, May 4, 1916. AMNH Dept. Herpetology Archives, Dickerson Collection.

188. Letter, Assistant K. P. Schmidt to William Beebe, Tropical Research Station, British Guiana, May 17, 1919. Beebe probably did not appreciate this advice, since he had long before relayed to the Department of Herpetology similar views about the abundance of "most tropical Reptiles and Amphibians" (see remarks attributed to Beebe by Dickerson in 1916, in her quoted letter to Halter and Mannhardt in Nicaragua, under Some Early Department Fieldwork).

189. Stejneger (1891a: 5) mentioned that "Even native whiskies . . . may be used in cases of necessity," but he stressed the importance of carrying tanks filled

with the "best quality of alcohol." Stejneger (1891b) included a brief addendum on using formalin, which later became (with mixed blessings) the standard for field preservation. The greatest merit of formalin (as a *temporary preservative*) is that a small quantity will be diluted before use with about 10 parts of water, making a large difference in the weight of supplies needing to be transported to backcountry camps (specimens are wrapped and the excess fluid discarded for the home-ward trip).

190. On March 7, 1930, G. K. Noble rather cantankerously wrote to Director G. H. Sherwood:

All Biological Survey specimens go eventually to the National Museum. The American Museum would gain nothing by sending 25 copies of our "Suggestions to Collectors" free to the Biological Survey . . . Is it your wish that we send out these "Suggestions" when it is so obvious that the Museum will not benefit?

On March 11, Sherwood assured Noble that was indeed his wish "as part of the policy of cordial cooperation with sister institutions" and to "kindly do this." AMNH Dept. Herpetology Archives, Noble Collection.

191. This tally is according to Gratacap (1900–1908, chap. 4: 33), whose numbers clearly were estimates. Of reptiles and batrachians, there were said to be 1000 in alcohol, 100 others (presumably mounted), and an unstated number of skeletons. Gratacap (op. cit., chap. 4: 36) went on to state the obvious: "From what has been said above of the collections of reptiles and fishes, it is evident that they form only a nucleus for further additions."

192. Letter, M. C. Dickerson to Mr. Harry R. Caldwell, The Yenping Mission, Yenping City, Fukien, China, November 8, 1920. AMNH Dept. Herpetology Archives, Dickerson Collection, Collectors & Collections VI.

193. The collection of Prince Maximilian was purchased 40 years before the 1909 establishment of a Department of Ichthyology and Herpetology. Because of its historic and fragile nature, and because of associated curatorial problems, the Maximilian material was recently withdrawn from the main collections and segregated in the type specimen room. It has been generally assumed that Maximilian "type" specimens are at the American Museum. Some are, some may be, and some are not. Perhaps some of those missing were simply traded by Wied-Neuwied, who collected and published before establishment of the concept of type specimen. Some "old-time mounted specimens, from the Maximilian Collection," evidently were in bad condition and discarded as "unfit for exhibition" (Gratacap, 1900–1908, chap. 4: 36–37). Vanzolini and Myers (MS) have attempted to identify the South American types.

Pages 110–141 (Expedition Sources; Early Department Fieldwork)

194. Certainly numerous other Museum expeditions and field trips also resulted in herpetological specimens. Some of these are doubtless more important than I realize, as may become apparent with further verification and consolidation in the electronic database. This is not quite as straightforward as I had originally hoped, owing in part to lack of consistency of data entry in the old book catalogues. For example, specimens from the

1909–1915 Lang-Chapin Congo Expedition were recorded more than one way in the collector column, including "Congo Expedition" and "Lang-Chapin Expedition."

195. AMNH Annual Report for 1912; *American Museum Journal* 12(6): 223, October 1912.

196. Accession record no. 18831, as well as AMNH Annual Report for 1915.

197. Letter and list of field supplies, Stella R. Clemence to M. C. Dickerson, July 25, 1912. AMNH Dept. Herpetology Archives, Dickerson Collection.

198. Letter ("Report of Work"), M. C. Dickerson to Bashford Dean, October 1, 1912. AMNH Dept. Herpetology Archives, Dickerson Collection.

199. Letter, M. C. Dickerson to Professor J. J. Thornber, University of Arizona, October 21, 1912. Dickerson had earlier written to Thornber about her proposed trip on June 11; the letter was forwarded to Thornber at the Smithsonian Institution, from where he answered with offers of help on July 12.

200. Letter, Mary Dickerson to Alexander Ruthven, October 16, 1913. AMNH Dept. Herpetology Archives, Dickerson Collection.

201. Telegram (August 3, 1917) and letter (August 9, 1917), M. C. Dickerson to Mr. Emmett R. Dunn. AMNH Dept. Herpetology Archives, Dickerson Collection.

202. Leonhard Alfred Mannhardt (born May 28, 1893) had first come to Dickerson's attention in June 1911, when he brought a pilot black snake to her, possibly in company with Clarence Halter (Dickerson wrote to him in care of Halter, asking for data). By 1914, Mannhardt was enrolled in biology courses at Yale University and started writing to Dickerson asking if there was a possibility of summer collecting for the Museum. AMNH Dept. Herpetology Archives, Dickerson Collection, Mannhardt Folder. According to available payroll records, Mannhardt worked only as a temporary Field Assistant for the Nicaraguan Expedition, starting on June 1, 1916, and terminating February 24, 1917.

203. Unless otherwise referenced, archival material on the 1916–1917 Nicaraguan expedition is in AMNH Dept. Herpetology Archives, Dickerson Collection, Nicaraguan Expedition folders I and II plus Halter folder, and Field Notes (Halter & Mannhardt).

204. This fund was set up when the Department of Ichthyology and Herpetology was founded in 1909: "The department is fortunate in having a generous fund at its disposal through the endowment of Mr. Cleveland H. Dodge" (Dean, 1910: 33). Although the annual report accounting was calling this the "Dodge Ichthyology Fund" by 1911, Dean appears to have been evenhanded in its disbursement and allowed Dickerson frequent access to the fund.

205. Halter's manuscript, part handwritten and part typed, was filed with his field notes and has survived.

206. Letter, M. C. Dickerson to Clarence R. Halter, Hotel Aleman, Sanchez, Rep. of Santo Domingo, June 4, 1915. AMNH Dept. Herpetology Archives, Dickerson Collection, Halter folder.

207. Bill of sale from Schoverling Daly & Gales, New York, May 29, 1916. AMNH Dept. Herpetology Archives, Dickerson Collection, Nicaraguan Exped. 1916, II.

208. Letters, G. K. Noble to Thomas Barbour, June

11, 1920, and Barbour to Noble, June 14, 1920. AMNH Dept. Herpetology Archives, Noble Collection.

209. Letters, Joseph R. Slevin, California Academy of Sciences, to G. K. Noble, April 27, 1923, and Noble to Slevin, May 5, 1923. AMNH Dept. Herpetology Archives, Noble Collection.

210. News note under "Experimental Biology," *Natural History* 23(2): 224, March–April, 1932.

211. Letter, G. K. Noble to Director G. H. Sherwood, February 13, 1930. AMNH Dept. Herpetology Archives Noble Collection, Sherwood folder.

212. Handwritten letter, Gilbert C. Klingel to G. K. Noble, December 22, 1930, and subsequent correspondence between New York and Inagua. AMNH Dept. Herpetology Archives, Noble Collection, Expeditions folders I1H2, I1H3.

213. Letter, G. K. Noble to Acting Director and Executive Secretary G. H. Sherwood, January 14, 1924. AMNH Dept. Herpetology Archives, Noble Collection, Expeditions folder, I1G.

214. "General Notes on Panama," four-page typescript prepared by G. K. Noble for C. M. Breder (n.d.). AMNH Dept. Herpetology Archives, Noble Collection, Expeditions folder I1G.

215. Letter, G. K. Noble to Acting Director Sherwood, December 15, 1924. AMNH Dept. Herpetology Archives, Noble Collection, Expeditions folder I1G. This folder also includes letters concerning a second Darién Expedition that Marsh was to make, but the idea of including Breder died for reasons not stated.

216. Letter, G. K. Noble to C. M. Breder, November 26, 1924. AMNH Dept. Herpetology Archives, Noble Collection, Breder Folder.

217. Mitman (1993: 642–643) is one of the few to have realized the significance of Burden's influence on Noble's affairs:

Financial backing for Noble's Department of Experimental Biology owed much to the efforts of Burden, who, along with relatives and friends, contributed \$47,500 for the operation of the department during its first five years. Burden's admiration and support of Noble as a research scientist was initially sparked by a course on paleontology that Burden took from Noble at the American Museum while pursuing a graduate degree in geology at Columbia University (A.M., 1926). Four years apart in age, the two had much in common. Both came from the elite of New York society; Burden's father made his fortune in iron and steel and owned a posh country estate on Long Island that was used by dignitaries such as the Prince of Wales. Both had attended Harvard as undergraduates and served in the navy. Burden's social status and his big-game-hunting expeditions to the Far East and Alaska upon his graduation from Harvard served as rites of passage into the wealthy sportsmen circles of New York City . . .

The informality of present-day America is so pervasive that it is difficult to fully comprehend the decorum that attended simple correspondence up through the first half of the 20th century. Burden provided an example in 1936, years after start of his close association with Noble:

Dear King:

Ever since you were my instructor in paleontology, I have been so accustomed to thinking of you and referring to you as "Dr. Noble" that I have found it well nigh impossible to change this habit of mine. Nevertheless, here is a try.

Letter, W. D. Burden to G. K. Noble, June 18, 1934. AMNH Dept. Herpetology Archives, Noble Collection, Burden Folder.

218. Letters and telegrams between G. K. Noble and E. R. Dunn, 1926. AMNH Dept. Herpetology Archives, Noble Collection, Dunn II folder.

219. From Harvey Bassler's application for membership in The Explorers Club, October 1931. AMNH Dept. Herpetology Archives, Bassler Collection.

220. Letter, G. K. Noble to Harvey Bassler, June 24, 1924, in response to Bassler's letter to Noble of April 14, 1924. AMNH Dept. Herpetology Archives, Bassler Collection.

221. AMNH Central Archives, Minutes of Board of Trustees Meeting, March 23, 1950.

Pages 141–160 (Multidisciplinary Expeditions)

222. Letters, Henry Fairfield Osborn to Robert Walton Goelet, January 7 and February 23, 1909. AMNH Central Archives, 771. In addition to Goelet and the Belgian Government, the other original subscribers to the Congo Expedition were Cleveland H. Dodge, A. D. Juilliard, Charles Lanier, J. P. Morgan, Jr., William Rockefeller, John B. Trevor, and William K. Vanderbilt.

Although Robert Walton Goelet was listed as a member of the Committee on African Exploration in 1910, he never became a trustee or otherwise seriously involved himself with the Museum; however, his son did. Robert G. Goelet, brought a deep commitment to *Natural History* (see Hellman, 1976), serving as eighth President of the American Museum and seeing to it that some of the Museum's modern expeditions received needed financing.

223. Copy of letter from James Chapin to his mother, November 12, 1909. AMNH Central Archives, 771.

224. AMNH payroll records show Leo E. Miller to have been employed as a Field Assistant during 1913–1917; he returned from military service on April 21, 1919, went on vacation, and resigned the next month on May 31.

Miller's (1918) book provides a fascinating glimpse of back-country travel in South America during 1911–1916, even though he did not relate particularly well to other cultures, which, by modern standards, lends a shallowness and occasional offensiveness to his writing. Unlike many of the Museum's early collectors, Miller was not much of a generalist, and he added little to the herpetological collections. For example, although he had good opportunity for collecting a series of distinctively colored *Boa constrictor* (subspecies *occidentalis*) near the extreme southern end of its range, skins evidently were taken only as trophies (Miller: 1918: 404, facing pl.) and never reached the Museum's herpetological collections.

225. An available AMNH payroll record shows George Kruck Cherrie to have been employed as a Special Assistant from 1915 to 1922 (he resigned on May 31, 1917, but was reemployed). But Cherrie, a very

competent field naturalist and collector, was earlier involved with Ornithology Curator Frank Chapman, who recommended his inclusion in the Roosevelt trip. Cherie by nature was an adventurer who was fortunate not to have been permanently incarcerated in some tropical jail; he seems to have been self-driven toward danger and backwoods confrontations. He also claimed (1930: 20) to have had many "psychic or telepathic experiences, perhaps more than the average man, because I have lived a life outside the haunts of the ordinary human being." He got along well with Roosevelt—at least in part because of a shared, exaggerated sense of *machismo*—and he later travelled into Central Asia with the ex-President's sons, Kermit and Theodore, Jr.

226. Letters in order of mention: Raymond L. Ditmars to F. A. Lucas, December 31, 1918; Charles A. Stone to Henry Fairfield Osborn, January 4, 1919; Osborn to Stone, January 7, 1919; Osborn to Lucas, January 7, 1919. Lucas scrawled on Osborn's copy (from Stone) of the Ditmars letter that "Mr. Pope called and talked over this question of Expeditions. He is now at University of Virginia." AMNH Central Archives, 51.

227. From a news note in *Natural History* 21(3): 326, May–June 1921.

228. Letter, G. K. Noble to Remington Kellogg [Kellogg], January 9, 1924. AMNH Dept. Herpetology Archives, Noble Collection.

229. The Whitney South Sea Expedition resulted in numerous ornithological reports published mostly in *American Museum Novitates*. These *Novitates* were later assembled by the ornithologists into three volumes, for which title pages, introductions, and summaries were published (in 1933 and 1942) for the first two volumes. The "official" start (September 1920) and ending (October 1939) dates of the expedition derive from the introductions for *Novitates* 1–25 and 26–50, respectively. The Museum's expedition file, however, credits dates as late as 1941, which is borne out by Bogert's comment quoted in the present text.

The scope and purpose of the expedition, as well as indications of the Whitney family's other immense contributions to the Museum, are set out in Henry Fairfield Osborn's last "Report of the President" (64th AMNH Annual Report for 1932, issued May 1, 1933). Included is a photograph of Henry Payne Whitney (died 1930) "taken in 1909, when he was captain of the American polo team which brought the international cup from England."

230. Memo, Mary LeCroy to C. W. Myers, August 23, 1998.

231. Letter, Charles M. Bogert to Walter L. Necker, Nav. Med. Res. Unit #2, FPO San Francisco, April 23, 1945. AMNH Dept. Herpetology Archives, Bogert Collection.

232. Richard Archbold was a Research Associate in the AMNH Department of Mammalogy from 1931 until his death on August 2, 1976. He was the son of Mr. and Mrs. J. F. Archbold and grandson of John D. Archbold, a president of the Standard Oil Company of New Jersey (now Exxon Corp.). In 1941, he founded the Archbold Biological Station in central Florida, which was operated as an American Museum field station until some few years after his death.

233. From a printed "Prospectus of the Pacaraima-Venezuela Expedition," 32 pages (n.d.).

234. National Science Foundation grant no. BSR 83-17687, R. W. McDiarmid, C. W. Myers, and J. G. Rozen, Jr., co-principal investigators, for "Zoology of the Cerro de la Neblina, Venezuela." (The coordinating grant to AMNH for 32 North American zoologists participating in the Neblina Expedition, which was sponsored by the Caracas-based FUDECI and the Venezuelan Government. Dr. Charles Brewer-Carías served as the expedition leader.)

Pages 160–173 (End of an Era; Appendices)

235. Clippings from the old *Brooklyn Daily Times*, *New York Evening Journal*, *New York World-Telegram*, *New York Herald Tribune*, and the *New York Times*, in AMNH Central Archives, 1212, uncl. Names of the newspaper sources attached to several of these archival clippings are either garbled or incorrectly have the word "City" interpolated.

236. Such volunteers, of course, were not the usual source of expeditionary personnel, as Murphy was careful to explain. But the doctorate was not then required of American Museum curators (although most had it), and it was at least possible (against odds) to earn a place in the Museum based on performance in the field and subsequent publication. Several young men hired as assistants on early expeditions, and whose collecting activities included amphibians and reptiles, later received curatorial appointments at the Museum: James Paul Chapin in Ornithology, Clifford H. Pope in Herpetology, and G.H.H. Tate in Mammalogy.

Women were not ordinarily included in early expeditions, with notable exceptions being the occasional wife (e.g., Mrs. Burden) or the scientist conducting her own fieldwork—such as Margaret Mead and Carlotta Joaquina Maury. (See Allison [1998], who noted that Maury was sometimes employed by the American Museum on special projects. As indicated herein under Karl Patterson Schmidt, Maury took Schmidt on his first foreign expedition, shortly before he started work at the Museum.) If there is still a "glass ceiling" in this regard, it is at least much higher than formerly. For example, women scientists representing the Museum have contributed substantially to the success of recent expeditions to the Venezuelan Guayana.

237. Some recent authors rather enthusiastically overextrapolate from the early 20th-century beliefs of Osborn and the Museum Trustees, as in the following extraordinary passage from Ogilvie (1991: 71).

Although science was ostensibly the focus of these [American Museum] expeditions, a cultural mystique lurking beneath the surface directed the interest in collecting. As Donna Haraway [1985] has indicated, the fear that decadence was eroding the substance of male, capitalist, imperialist society motivated the three public activities of the American Museum: exhibition, eugenics, and conservation. By collecting and preserving specimens, dwindling nature could be fixed "in the face of extraordinary change in the relations of sex, race, and class." In the very act of collecting, the rightful male role of the domination of nature and of his own sphere could be played out. If after struggling with recalcitrant nature the scientists-

explorers could prevail and wring her secrets from her, the sovereignty of man could be confirmed. The same motivation may have inspired the cultural imperialism of the western countries.

Conventional wisdom, as expressed by Mary Dickerson in 1919, considered the "collecting instinct" to be "an element in boy nature," although the women collectors among us do very well indeed. I do not claim knowledge of what motivates my female collecting colleagues, but I at least had no idea that my own activities might be motivated by anything so grand as the sovereignty of man and Western imperialism!

238. My few remarks about Osborn in this study mostly relate to his administrative influence on the Department of Herpetology, which seems only periodically to have drawn his attention. Recent writers have attempted to probe his scientific and moral beliefs, but I think with limited success—in part because of the complexity of the man and the difficulty in seeing him in his entirety. For example, in stressing Osborn's differences mainly with the geneticist Thomas Hunt Morgan, Rainger (1991a) extrapolated with such conclusions as the following:

[p. 134] What Osborn could not accept was work in experimental biology that challenged his interpretations and the whole thrust of work in morphology and natural history. [p. 139] Osborn opposed experimental biology on methodological and philosophical grounds . . . [p. 142] He claimed that experimental biology, by cutting itself off from other methods and interpretations, was symptomatic of the specialization and compartmentalization that was plaguing contemporary society. [p. 246] By the 1930s his outright rejection of genetics and experimental biology was no longer viable.

Rainger's claim that Osborn could not accept experimental work challenging his interpretations was contradicted by Murphy's (1950: 319) recollection:

If . . . Professor Osborn did not always welcome opinions that differed from his own in the administrative sphere . . . in scientific research no such attitude was ever apparent . . . He listened with an entirely open mind when G. K. Noble, at a meeting of the Journal Club, suggested as a result of certain endocrine experiments that the evolutionary significance of the orthodox Cope-Osborn theory of trituberculy in mammalian molar teeth might have to be weighed anew.

Rainger's conclusions also need to be weighed anew, since he failed to notice that Osborn had enthusiastically authorized on a grand scale the first experimental research laboratory in any museum (see Osborn's 1928 "Report of the President" as quoted under Era of Gladwyn Kingsley Noble). Osborn fought to keep Columbia University from hiring G. K. Noble away from the Museum as Morgan's replacement after Noble informed Osborn this was his "opportunity of being the successor to the leading experimental zoölogist in the world." Letter, G. K. Noble to H. F. Osborn, March 20, 1928. AMNH Dept. Herpetology Archives, Noble Collection.

The strong focus of Rainger's book seems to imply that Vertebrate Paleontology was the Museum's major

theme during the Osborn presidency, but Osborn's presence was manifest throughout the Museum, which was evolving major programs in anthropology and zoology. Osborn was succeeded in the presidency by F. Trubee Davison, not, as implied by Rainger (p. 245), by Albert E. Parr, who was Davison's third director.

239. From Myers and Donnelly (1996: 3). See Campbell and Frost's (1993: 53–56) chapter on conservation biology for elaboration on this train of thought. Their essay could profitably be studied in government ministries everywhere.

240. Report of the Review Committee for the Departments of Herpetology and Ichthyology (American Museum of Natural History), June 1987. This committee reviewed two departments whose consolidation had been earlier announced to take effect on July 1, 1987; its members were Drs. Daniel Cohen, Bruce B. Collette, C. Richard Robins, Jay M. Savage (Chairman), and Ernest E. Williams. Dept. Herpetology Archives, C. W. Myers Collection.

241. Letter, Henry Fairfield Osborn to M. C. Dickerson, January 19, 1920. AMNH Central Archives, 499.

242. AMNH Dept. Herpetology Archives, Noble Collection.

243. William King Gregory submitted Noble's bibliography along with an obituary notice (Gregory, 1942) for publication in the *Year Book of the American Philosophical Society*, which, however, was trying to reduce the size of the *Year Book*. The Society's Executive Officer returned the bibliography "with the hope that it will be published elsewhere" (letter, E. G. Conklin to W. K. Gregory, February 12, 1942. AMNH Dept. Herpetology Archives, Noble Collection, Gregory folder), a "hope" now realized nearly 60 years later. A note pencilled on Conklin's letter indicates that the manuscript bibliography was returned by Gregory to Mrs. Langslow, who had prepared it (see text).

244. See under "Writings, Requests for (Aegis, Yonkers High School Magazine)" in AMNH Dept. Herpetology Archives, Noble Collection.

245. Necker wrote to Bogert on December 11, 1940, two days after Noble's death (AMNH Dept. Herpetology Archives, Bogert Collection):

I hear that Noble died . . . I guess that we had better run a bibliography of him in the current number of *Herpetologica* . . . Could you find out for me whether he has any papers in press? . . . P.S. I have no Noble papers since 1937.

Bogert responded on December 12 (mail was quicker then!):

Your letter was received today, and I have instructed the Publicity Department to forward you a copy of their press release which gives most of the essential activities in Doctor Noble's career . . . I wonder whether you have a complete list of all his papers, including numerous small abstracts . . . Will you confine his bib. to herpetological papers? Fortunately, we have recently had all his papers, excluding very recent ones, bound, and a complete bibliography can easily be assembled.

Necker (letter of December 16) said that he would be pleased to receive a copy of the list but expressed cer-

tainty that he had a complete bibliography "at least, through 1937." His conviction may have been based on a naive belief that he had been receiving all of Noble's papers. Necker had written to Noble on February 19, 1932, announcing that he had decided to become a herpetologist and asking for a file of reprints. Noble responded on February 26 that "I have placed your name on my mailing list to receive all future separates" (AMNH Dept. Herpetology Archives, Noble Collection). But Noble did not get separates of all his publications, some of which were represented in early department files only as copies made by typewriter.

Without help, it is improbable that Necker would have learned of most of the abstracts (some not identified as abstracts by Necker) and certain other obscure items not distributed by Noble (e.g., 1921k [see text] and the annual reports, probably not seen and explicitly excluded by Necker as being out of scope). A few titles (1922d, 1931a) lacking in Noble's AMNH typescript "Bibliography" also are lacking in Necker (1940). Thanks at least in part to Bogert, however, Necker's effort is remarkably complete, lacking scarcely half a dozen herpetological titles additional to seven posthumous ones.

Finally, the bound volumes mentioned by Bogert were later turned over to Mrs. Noble, for which reason Bogert had another set of papers bound "to be kept permanently in the herpetology library" (letter, Secretary Esther Langslow to Thomas Barbour, April 1, 1941, Dept. Her-

petology Archives, Noble Collection). This set includes only herpetological papers, which are arranged following Necker, with Noble's single-authored papers (in 2 vols.) separated from those with coauthors (also in 2 vols.).

246. A month after Noble's death, Dunn wrote to Bogert soliciting the task of editing Noble's caecilian work. Bogert turned over Noble's notes and rough drawings (made in London and Berlin), after having the drawings copied by an artist. Questions arose that Dunn said he could not answer (e.g., "what lines represent sutures and what do not?"), inasmuch as he could not check the original specimens. Dunn returned the material and suggested obtaining an opinion from W. K. Gregory. Bogert advised Mrs. Noble that "Dr. Gregory feels that the materials are essentially raw data [and that] the material had best be filed in the departmental archives [for] some future student of the cranial anatomy of the caecilians." From letters between C. M. Bogert and E. R. Dunn, and Bogert to Mrs. Noble, various dates in 1941–1942. AMNH Herpetology Archives, Bogert Collection.

There was no formal herpetology archive in those days, but Noble's material was retained and is preserved in the present archives. There are his drawings (together with the copies that Bogert had made) and associated notes, but no real manuscript. AMNH Herpetology Archives, Noble Collection, Research: Caecilian Notes, folders II D1, D2.

INDEX

Page numbers in **boldface** refer to main entries; page numbers in *italics* indicate illustrations. The endnotes (indicated by “n”) are only selectively indexed, for particularly significant biographical or other information.

- Adler, Kraig, 40, 49, 120, 148
 Airplane (influence of), 116, 157, *159*, 163–164
 Akeley, Carl, 117
 Allee, Warder Clyde, 36, 41
 Allen, Joel A., 95
American Museum Journal (see also *Natural History*), 8, 63, 72, 74, 117, 146, 165
 American Museum of Natural History, 7, *64–65*, 96
 Amphibians and Reptiles, *see* Department of
 Anderson, James, 110
 Andrews, Roy Chapman, 24, 38–39, 50–54, 57, 117, 136, **146–150** (*149*), 163, 214 (n 131)
 Animal Behavior, *see* Department of
 Animal Behavior, Hall of, 86
 Annual reports, 94–95, 164–165, 171–172, 180–181
 Archbold, Richard, 152, 162
 Archives, Central, 164
 Archives, Department of Herpetology, 164–165
 Arctic exploration, 117, 163
 Armstrong, Lorenzo D., 133
 Aronson, Lester R., 53
 Arsenal Building (Central Park), 95
 Associate Dean of Science (as Museum Title), 63

 Barbour, Thomas, 25–28, 31, 34, 42, 47–48, 79, 95, 125–126
 Barnett, Madolin Clara, 101, 103
 Barrowclough, George F., 160
 Bassler, Harvey, 112, **139–141** (*140*)
 Beck, Rollo Howard, 150, 152
 Beebe, William, 32, 84, 108, 112, 120–121, 148, 210 (n 76)
 Bellard Pietri, Eugenio de, 160
 Bellevue Psychiatric Ward, 15, 16
 Bergmann, Eugene, 89–90, 92
 Berkey, Charles P., *149*
 Bessie, Alvah, 17, 206–207 (n 46)
 Bibliographic projects (Herpetology), 166–169
 Biochemical systematics, 35
Biology of the Amphibia, The, 35–36, 167
 Bird, Junius, 162
 Blanchard, Frank Nelson, 28, 47
 Bloomingdale Hospital, 16, 17
Bob and Ray, 139
 Bogert, Charles Mitchill, 21, 39, 41–42, **44**, 48–49, 53, **54–60** (*55*), 87–90, 98, 100, 102–106, 110, 127, 148, 152, 168, 172–173
 Boy Scouts, 40, 104–105
 Boulenger, George Albert, 27, 96
 Breder, Charles M., 58, 125–126, **134–135**
 Brewer-Carías, Charles, 159
 Bronx Zoo, *see* New York Zoological Society
 Brooklyn Museum, 110
 Brown, A. L., 167
 Brown, Barnum, 162
 Bumpus, Hermon C., 8, 142
 Burden, Katherine White, 139
 Burden, W. Douglas, 35, 40, 56, 86, **135–139** (*136*), 146, 162, 221 (n 217)
 Burkhard, Richard W., Jr., 36
 Burt, Charles E., **43**, **47–48**, 60, 152
 Burt, May Danheim, 47–48

 California Academy of Sciences, 96, 125
 Camp, Charles Lewis, 12, *18*, **28–30** (*29*), 31–32, **42–43**, 98, 125–126, 167–168
 Camp, Robert D., 112
 Carr, Archie F., 60
 Carter, T. D., 156
 Carvalho, Celso Morato de, 160
 Catalogues and cataloguing, 100–102
 Chairman (as Museum title), 49, 60
 Chapin, James P., **141–144** (*143*), 162
 Chapman, Frank, 154–155
 Cherrie, George K., 144, 146
 Clearing and staining, 98
 Clemence, Stella Risley, 10, *11*, 100, 103, 117–118, 166, 205 (n 14)
 Cocroft, Rex, 159
 Cohen, Nathan, 93
 Colbert, Edwin H., 57–58
 Cole, Charles James, **61**, 87, 93, 159–160, 168
 Coleman, W. Wallace, 133–134
 Colgate, S. Bayard, *149*
 Collecting leaflets, 104–109 (*106–107*), 125–126, 218–219 (n 185)
 Collection growth and diversity, 12, 34, 59, 61, 109–110, *111*
 Collection organization and location, 96–97, 102
 Collections
 Anderson, J., 110
 Brooklyn Museum, 110
 Conant, R., 110

- Cope, E. D., 110
 Etheridge, R., 110
 Gosner, Kenneth, 110
 Johnson, R.D.O., 43
 Liner, E., 110
 Maximilian (Wied-Neuwied), 7, 63, 95, 100, 110, 220 (n 193)
 Minton, S., 110
 Newark Museum, 110
 Organ, J., 110
 Orphan, 110
 Osteological, 98
 Rutgers Univ., 110
 Toledo Zoological Soc., 110
 Virginia Polytechnic Inst., 110
 Columbia University, 27, 28, 30–31, 120, 142
 Committee on Herpetology, 35
 Computerization, 101–102, 104
 Conant, Roger, 49, 60, 110
 Cooper, Merian, *see* *King Kong*
Copeia, 8
 Council of the Scientific Staff, 103
Country Life in America, 8
 Cowles, Raymond B., 54
 Crosby, Ruth, *see* Noble, Ruth Crosby
 Curatorial Associate (as Museum title), 63, 216 (n 155)
- Daly, John W., 157–158, 160
Dark Trails, 146
 Davis, Sarah (Mrs. Pope), 52
 Davison, F. Trubee, 50, 53, 57
 Dean, Bashford, 8–10 (9), 12, 13, 61, 95, 120, 163
 Defosse, F. J., 136, 137
 Department of Amphibians and Reptiles, 57, 59, 215 (n 142, 143)
 Department of Animal Behavior, 36, 211 (n 82)
 Department of Anthropology, 117, 141
 Department of Central Asiatic Exploration and Research, 52
 Department of Comparative and Human Anatomy, 52
 Department of Education, 48
 Department of Entomology, 158–160
 Department of Experimental Biology, 36, 37, 39, 44, 50, 53–54, 87, 211 (n 82)
 Department of Fishes and Aquatic Biology, 135
 Department of Geology and Paleontology, 58
 Department of Herpetology, 13, 39, 44, 50, 53–54, 59, 61–63, 64, 86–87, 104–105, 109, 112, 135, 141, 158–160, 163, 205 (n 21), 211 (n 82), 215 (n 143)
- Department of Herpetology and Experimental Biology, 35, 163, 210 (n 78)
 Department of Herpetology and Ichthyology, 61–62, 215–216 (n 152)
 Department of Ichthyology, 52, 59, 61, 104, 158–160
 Department of Ichthyology and Herpetology, 8–13, 96, 100, 163, 204 (n 8)
 Department of Invertebrate Zoology, 7, 95, 119
 Department of Invertebrates, 36
 Department of Ornithology, 25, 158–160
 Department of Reptiles, 63, 205 (n 21)
 Department of Vertebrate Paleontology, 57–58, 117
 Department of Woods and Forestry, 8, 10, 13, 64–65, 69, 119, 170–172
 Department offices, location of, 64, 102–103
 Diamond, Jared M., 152
 Dickerson, Frank, 16
 Dickerson Library, 166
 Dickerson, Mary Cynthia, *frontisp.*, 7, **8–17** (14), 32, 40, 50, 142, 163
 Administrator, 64
 AMNH employment record, 204 (n 10)
 Author, 8, 17, 169
 Bibliographic projects, 166–168
 Bibliography, 169–172
 Biographical, 203–204 (n 5)
 Collection builder, 12, 104, 110, 119–121, 129
 Curator, 95, 97–99, 108
 Curator of Woods and Forestry, 8, 13
 Death of, 17, 206 (n 44)
 Dickerson and her staff, 10–12, 17–31, 60
 Editor, 8, 13, 117, 146, 169–170, 204–205 (n 11)
 Exhibition work, **64–80**, 83, 85–86, 89–90
 Fieldwork, 12, 77, 79, **117–119**, 123
 Mental illness of, **13–17**, 23–24, 31, 117, 209–210 (n 72)
 Photographic skills, 8, 12, 64
 Research, 17, 24, 34
- Ditmars, Raymond Lee, 7, 10, 68, 120–121, 147
 Dodge, Cleveland, 51–53, 146
 Dodge, Cleveland H., Fund, 120
 Donnelly, Maureen A., 160
 Dowling, Herndon G., 168
 Doyle, Sir Arthur Conan, 154–155
Dragon Lizards of Komodo, 136
 Dunn, Emmett Reid, **18–19** (18), **42**, 43, 48, 105, 119–120, 122, 125, 135, 137, 162, 173
- Eleutherodactyls (*Eleutherodactylus*), 40
 Emerson, Alfred, 108

Estes, Richard, 43
 Etheridge, Richard, 110
 Evans, Gertrude, 167
 Exhibits, *see* Herpetology Museum Exhibits
 Expedition (modern usage defined), 116
 Expedition File, 110, 165
 Expedition sources of collection, 110–116 (*III*)
 Expeditions
 Albatross Exp. to Gulf of California (1911), 74, 112, 165
 American Museum Bolivian Exp. (1963–1965), 115
 American Museum Hispaniola Exp. (1935), 34, 44, 114, 133
 Anderson Bolivian collections (1979–1991), 116
 Andrews Philippine Exp. (1909), 112
 Angelo Heilprin Exp. to Dominican Republic (1922), 80, 113, 129
 Anthony–Goodwin West Indies Exp. (1926), 113
 Anthony–Tate Exps. to Ecuador (1920–1924), 113
 Archbold Cape York (Australia) Exp. (1948), 115
 Archbold Exps. to New Guinea (1933–1964), 114, **152–153**, 162
 Archbold Madagascar Exp. (1929–1931), 114
 Armstrong Santo Domingo Exp. (1932–1933), 114, 131, 133
 Asiatic Exps. (1st, 2nd, 3rd), *see* Central Asiatic Exps.
 Astor–Galápagos Exp. (1930), 114
 Barnum Brown Cuban Exp. (1919), 113
 Barnum Brown Exp. to Abyssinia and Somaliland (1920), 113
 Barnum Brown Exps. to India, Burma, Greece (1921–1925), 113
 Bassler Exps. in Upper Amazon (1921–1931), 113, **139–141**
 Batty Exp. to Mexico (1903–1906), 112
 Beebe–New York Zool. Soc. collections British Guiana, Venezuela, Trinidad, etc. (1910–1959), 112
 Bogert Field Trip to Ceylon (1965), 115
 Bogert Mexican Exps. (1939–1968), 114
 Breder in Darién, *see* Marsh–Darién Exp.
 Burden Dutch East Indies Exp. (1926), 19, 34, 42, 83, 113, **135–139**, 162
 Burt and Burt Mississippi Valley collection (1929), 114
 Butler AMNH–Western Australian Exp. (1964–1965), 115

Expeditions (*continued*)

Camp (Robert) Arizona Exp. (1919), 113
 Carlisle–Clark African Exp. (1928), 113
 Carr and Bogert Honduran collection (1949), 115
 Central Asiatic Exps. (1916–1931), 24, 34, 49–51, 113, 136, **146–150** (*149*)
 Cerro Guaiquinima, Venezuela, exp. to (1990), 116, 160
 Chapin–Edson Congo Exp. (1929–1931), 114
 Chapin–Sage Ruwenzori–Kivu African Exp. (1926–1927), 113
 Chapman Exps. to Florida, Cuba, and Trinidad (1891–1894), 112
 Cole collections from southwestern and other U.S. sites and Mexico (1970–1998), 115
 Cole–Townsend collections from Guyana, Surinam, Venezuela, Ecuador, Trinidad, and Martinique (1979–1998), 116
 Columbia Univ.–Amer. Mus. Anatomical Exp. to Belgian Congo and French West Africa (1929–1931), 114
 Conant Mexican Collections (1949–1967), 115
 Correia Gulf of Guinea Exp. (1929), 114
 Crampton South Seas Exp. (1920–1921), 113
 Cuban and other West Indian materials from Albert Schwartz (1953–1978), 115
 Day Roraima Exp. (1927–1928), 113, **155–156** (*156–158*)
 De Sola Cuban Exp. (1929), 114
 Dickerson Arizona Desert Exp. (1912), 112, **117–119**
 Duida Exp. (1912–1913), 155 (*see also* Tyler Duida Exp.)
 Dunn North Carolina Exp. (1916), 112, **119–120**
 Environmental surveys of the upper Río Chiriquí Valley, Río Changuinola, and the transisthmian pipeline route in western Panama (1976–1982), 115
 Faunthorpe–Vernay Exp. to India, Burma, Siam, Assam, Nepal (1922–1923), 113
 Fleischmann–Clark Indo-China Exp. (1936), 114
 Foley collections from eastern U.S. (1957–1986), 115
 Ford Brazilian and Peruvian collections (1991–1993), 116
 Frost collections from Namibia, South Africa, and Viet Nam (1994–1998), 116
 Gentry–Myers Exp. to Cerro Tacarcuna, Panama (1975), 115

Expeditions (*continued*)

- Gilliard Exps. to New Guinea (1950–1964), 115, **154**
- Gilliard Mt. Macarena Colombian Exp. (1941), 114
- Goelet American Museum–Terramar Exp. to Auyantepui (1994), 116, **160**
- Goelet American Museum–Terramar Exp. to the Northwestern Tepuis (1995), 116, **160, 161**
- Gregory–Raven Exps. to Australia (1921–1923), 113
- Griscom–Benson Exp. to western Panama (1924), 113
- Halter–Mannhardt Nicaraguan Exp. (1916–1917), 26, 108, 112, **120–121**, 123, 163
- Halter Santo Domingo Exp. (1915), 112, 119, 131, **132**
- Hassler collections eastern U.S. (1924–1936), 113
- Hecht Jamaican collection (1950), 115
- Heilprin Florida Exp. (1929), 114
- Heilprin Santo Domingo Exp. (1930), 34, 44, 114
- Heilprin Yucatán Exp. (1929), 114
- Hoogmoed–Myers expedition to Lely Mountains and S.E. Surinam (1975), 115
- Jared Diamond Papua New Guinea Exps. (1965–1967), 115
- Keith East-African collection (1962–1964), 115
- Klemens and Ford Tanzanian collections (1994–1996), 116
- Klemens Exp. to Northern Chad (1998), 116
- Klemens New England and European collections (1979–1998), 116
- Klingel Haiti Exp. (1929), 34, 114, 129, 131
- Klingel West Indies Exp. on board *Basilisk* (1930–1931), 34, 44, 114, **133–134**
- Ladew–Tate Exp. to Bolivia and Peru (1926), 113
- Lang–Chapin Congo Exp. (1909–1915), 12, 19, 22, 108, 112, **141–144** (*143*), 162
- Lang–La Varre British Guiana Exp. (1922–1923), 113
- Legendre Indo-China Exp. (1931–1932), 114
- Legendre Iran Exp. (1938), 114
- Lumholtz Exps. to Sierra Madre (1890–1898), 112
- MacDougall Mexican collections (1934–1947), 114
- Malkin misc. collections from Mexico, Nicaragua, etc. (1941–1972), 114
- Malkin South American Exps. (1957–1991), 115
- Marsh–Darién Exp. (1924), 34, 58, 113, 126, **134–135**
- Marshall Texas Cave Exp. (1928), 113
- Martin–Beatty Martinique Exp. (1967), 115
- Miller [“Miller–Roosevelt”] South American Exp. (1915–1916), 112
- Minton Pakistani Survey (1958–1962, 1965), 115
- Mission Zoologique Franco-Anglo-Américaine à Madagascar (see Archbold Madagascar Exp.)
- Moore Australian Collection (1952), 115
- Morden–Graves Asiatic (Turkestan) Exp. (1929–1930), 114
- Murphy collections from Pacific littoral (1911–1945), 112
- Musser Celebes Exp. (1973–1976), 115
- Myers–Daly Exps. in Western Colombia (1970–1978), 115
- Myers misc. collections from Panama, Brazil, Colombia, Ecuador, Peru, Surinam, Venezuela, Trinidad and Tobago (1968–1993), 115
- Noble Woods Hole collection (1928), 114
- Noble collections from eastern U.S. (1912–1940), 112
- Noble Cuban Exp. for *Deiropyx* (1937), 114
- Noble–Marshall Ozark Exp. (1928), 113
- Noble West Virginia Exp. (1930), 114
- Olalla Ecuador Exps. (1923–1935), 113
- Oliver Bimini Field Trip (1947), 59, 115
- Ortenburger Gila Monster Exp. (1923), 34, 45, 82, 113
- Pacaraima–Venezuelan Exp. (1931–1932), 44, **156–157**, 165
- Parker specimens from Papua New Guinea etc. (1960–1987), 115
- Phelps’ Ornithological Exps., 156–157
- Phelps Venezuelan Exp. (1937–1938), 114, **157, 159**
- Phipps Tapirapecó Exp. to southern Venezuela (1989), 116, **159–160**
- Pope North Carolina Exp. (1927), 113
- Pratt Honduras Exp. (1932), 114
- Puritan*–American Museum Exp. to Western Mexico, 115, 162
- Rockefeller Mexican Exp. of the American Museum of Natural History (1947), 115, 165
- Rockefeller–Murphy Tanganyika Exp. (1928–1930), 114
- Roosevelt–Rondon Exp. (see Roosevelt So. Amer. Exp. of AMNH)

Expeditions (*continued*)

- Roosevelt South American Exp. of AMNH (1913–1914), 112, **144–146** (145)
- Roraima Exp., *see* Day Roraima Exp.
- Rüthling Mexican Exp. (1919–1920), 113
- Ruthven-von Krockow Arizona–New Mexico Exp. (1906), 7, 112
- Sage West China Exp. (1934–1935), 114
- Sanford–Legendre Abyssinian Exp. (1928), 114
- Scarritt Patagonian Exp. (1930), 114
- Scientific survey Puerto Rico and Virgin Islands (1919), 23, 113, **121–122**
- Snyder East African Exp. (1938), 114
- Spalding–Hosmer Australia Exp. (1960), 115
- Spalding–Peterson Australia–New Guinea Exp. (1959), 115
- Straus Central African Exp. (1929), 114
- Tate Exp. to Mt. Turumiquire, NE Venezuela (1925), 113
- Taylor Sudan Exp. (1926–1927), 113
- Tepequém, Exp. to Serra (1993), 160
- Terry–Holden Exp. to British Guiana (1937–1938), 44, 48, 114
- Tilger collections from Mexico, Central America, and South America (1974–1987), 115
- Tyler Duida Exp. (1928–1929), 114, **156**
- Van Voast–American Museum of Natural History Bahama Islands Exp. (1952–1953), 115
- Venezuela–AMNH Exp. to Cerro Yapacana, Upper Orinoco (1978), 116, **157–158**
- Venezuelan–American Exp. to Cerro de la Neblina, southern Venezuela (1984–1985), 94, 116, **158–159**
- Vernay Angola Exp. (1925), 113
- Vernay–Faunthorpe East Indies Exp. (1926–1929), 113
- Vernay–Hopwood Chindwin (Burma) Exp. (1935), 114
- Vernay–Lang Kalahari Exp. (1930), 114
- Voss–Simmons collections from French Guiana (1991–1994), 116
- Weber Panama Exp. (1928), 114
- Whitney South Sea Exp. (1920–1941), 24, 34, 113, **150–152** (151), 161–162, 222 (n 229)
- Zweifel Australian collection (1980–1981), 116
- Zweifel New Guinea Exps. (1964–1969, 1987), 115, 153, **154**
- Zweifel misc. collections from Mexico, Panama, Nicaragua, and Ecuador (1956–1979), 115
- Expeditions by decade (tally), 117
- Experimental Biology, *see* Department of
- Faunce, Wayne M., 51, 53–54
- Fawcett, Col. P. H., 155
- Fay Wray, *see* Burden, Katherine White
- Field, Arline, 10, 22, 27, 99, 103, 108, 121, 166, 205 (n 16)
- Field Museum of Natural History, 24, 34, 41, 53, 99, 106, 108, 148
- Fletcher, Maud Lewis, 133
- Foley, George W., 103–104
- Ford, Linda Sherill, 63, 107–108, 159
- Frick, Childs, 162
- Friedmann, Herbert, 142, 144
- Frisch, Karl von, 36
- Frog Book, The*, 13, 64, 104, 117, 123
- Frost, Darrel, 30, **63**
- Fundación para el Desarrollo de las Ciencias Físicas, Matemáticas y Naturales (FUDECI), 158–160
- Fundación Terramar, 160
- Gans, Carl, 60
- Gilliard, E. Thomas, 154
- Goelet, Robert G., 159–160, 163
- Goelet, Robert Walton, 142, 221 (n 222)
- Gosner, Kenneth, 110
- Granger, Walter L., 148, 149
- Gratacap, Louis Pope, 95–96
- Great Depression, *The*, 36, 44, 157, 160–162, 164
- Great Expeditions, *The*, 110, 141, 143, 147, 152, 161, 164
- Gregory, William King, 25, 28–30, 32–33, 38, 42–43, 52–53, 172
- Griscom, Ludlow, 22
- Guggenheim Museum, 93
- Hall of Animal Behavior, 86
- Halter, Clarence Robert, 10, **119–121**, 123, 129, 205 (n 17)
- Hassler, William G., 39, **43–45**, 46, 86, 101, 103–104, 131, 132–133, 157
- Healy, John, 103
- Hellman, Geoffrey, 53–54
- Herpetological Information Search Systems (HISS), 168
- Herpetological Review*, 168
- Herpetologists' League, 168
- Herpetology, *see* Department of
- Herpetology and Experimental Biology, *see* Department of
- Herpetology Museum Exhibits, **63–94** (65)
- Adaptations of Amphibians and Reptiles, 93
- Aristelliger* Reptile Egg Group, 132
- Arizona Habitat Group, 74, 118
- Bullfrog Group (1911), 70–71, 72, 79

Herpetology Museum Exhibits (*continued*)

- Copperheads in the Palisades (1905), 68
 First Reptile Hall (1913), **79–80**
 Florida Gopher Turtle Group, 83
 Florida Reptile Group (1918), 75, 77–79 (78)
 Galápagos Island Group, 84
 Giant Salamander Group (1912), 73–74 (73), 79
 Hall of the Biology of Amphibians and Reptiles (1977), 61, **88–93** (88–89, 91–92), 168
 King Cobra (1926), 83, 91
 Komodo Dragon Group (1928), 86, 137, 138
 Live animals, 87–88
 Lower California Group (1913), 74, 75, 79
 Mary Dickerson's habitat groups, **71–80**
 Model-making with clay and plaster, 66, 74
 Model-making with plastic, 90, 92
 Mountain of the Mist, 94
 New Hall of Reptile and Amphibian Life (1927), **80–87** (80–86, 129, 137–138)
 Paraffin infiltration, 83, 85–86, 90
 Push-button Rattlesnake (1931), 44
 Rhinoceros Iguana Group, 129, 130
 South Carolina Snake Group (1912), 73
Sphenodon Group (1925), 82–83, 85
 Temporary exhibits (*see also* live animals), 93–94
 Toad Group, 74–75, 76–77, 79
 Water Monitor Group (1911), 72
 Wax casting, 65–66, 67–69, 74, 83, 90
 Heyer, W. Ronald, 160
 Hitchcock, Charles B., 156
 Holder, Joseph B., 95
 Hopkins, Margaret D., 14
 Huber, Otto, 158
 Hussakof, Louis, 8
 Hyman, Libbie, 36
 Ichthyology and Herpetology, *see* Department of
In the Wilds of South America, 146
 Inger, Robert F., 41, 53
 Instituto Nacional de Pesquisas da Amazônia, 160
 Invertebrates and Invertebrate Zoology, *see* Departments of
 Irreducible minimum, the, 59
 Jaques, Francis L., 83
 Jar labels, 98–99
 Jars, crocks, and tanks, 95, 97–98
 Jordan, David Starr, 17, 95
 Kammerer, Paul, 53
 Kauffeld, Carl F., 39, **43**, **48**, 54, 56, 103
 Kellogg, Remington, 150

- Kennedy, John Michael, 54, 116, 164
 King, John, 46
King Kong, 139
 Klauber, Laurence, 106
 Klemens, Michael, 94
 Klingel, Gilbert C. 44, **133–134**
 Koestler, Arthur, 53
 Koyama, Tetsuo, 93
 Labels, *see* jar labels
 Lakehurst, New Jersey, 28
 Lang, Herbert, **141–144**
 Langslow, Mrs., *see* Stetzer, Esther Alice
 Lankester, Edwin Ray, 154
 Liner, Ernest, 110
 Lost world, a (Serra Ricardo Franco), 154–155
Lost World, The, 154–155
 Lost Worlds (Guayanán tepuis), 44, **154–160** (156–159, 161), 162
 Lucas, Frederic A., 13, 15, 32, 34, 94, 147–148, 171
 Lutz, Frank E., 125
 Mackenzie, George M., 15–16
 Macmillan, Lindsay, 152
 Malkin, Borys, 112
 Manhattan State Hospital, *see* Ward's Island
 Mannhardt, Leonhard Alfred, **119–121**, 123
 Marsh, Richard Oglesby, 134–135
 Matalas, Bessie, 103
 Maury, Carlotta Joaquina, 20, 207, 222 (n 236)
 Maximilian, *see* under collections and under Wied-Neuwied
 McDiarmid, Roy W., 159
 McDowell, Samuel B., 93, 152–153
 Mead, Margaret, 162
 Merz, Mario, 93
 Metropolitan Museum of Art, 9, 12
 Michelangeli Ayala, Armando, 160
 Miller, Leo E., 144, 146, 155
 Minton, Sherman A., 60, 110
 Mitman, Gregg, 36, 38, 137, 139
 Moore, John A., 60
 Morgan, Thomas Hunt, 35
 Morris, Frederick K., 149
Moths and Butterflies, 13
 Mountain of the Mist, 94
 Murphy, Robert Cushman, 150, 162
 Museo de Historia Natural La Salle (Caracas), 160
 Museu de Zoologia (Universidade de São Paulo), 160
 Museum of Comparative Zoology, Harvard College, 25, 27, 95

- Museum of Zoology, University of Michigan, 95–96, 99
- Museum specimen cases and wood trays, 97
- Myers, Charles William, **60–62**, 87, 93–94, 157–160, 168
- Myers, George Sprague, 40–41, 82, 126, *128*, 148
- National Science Foundation (NSF), 63, 159, 168, 216 (n 154), 222 (n 234)
- Natural History* (see also *The American Museum Journal*), 8, 13, 17, 129, 133, 135, 137, 146, 165, 172
- Natural History Society of Maryland, 133
- Necker, Walter L., 172
- Needham, James G., 20
- Nelson, Ellen E., 101, 167
- Nelson, Gareth, 61, 62
- New Conquest of Central Asia, The*, 147
- New York Aquarium, 59, 68, 74, 135
- New York Botanical Garden, 72, 93
- New York Zoological Society (Bronx Zoo), 7, 17, 59, 68, 74, 84, 93–94, 98, 112, 147
- New Yorker*, 137
- Newark Museum, 110
- Nichols, John Treadwell, 8, 25–26, 40, 95, 110, 117, 209 (n 60)
- Nicholson, Thomas D., 58, 61
- Night collecting (as “new” technique), 105, 108–109, **122–126** (*124*), *128*, 135
- Noble, Gladwyn Kingsley, 12, 17, *18*, **25–28**, 29–31, **32–39**, 60, 94, 118, 121, 122, 133–134, 141–142, 150, 162–163
- AMNH employment record, 210 (n 75)
- Bibliographic projects, 166–168
- Bibliography, 172–181
- Biographical, 208–209 (n 57, 58)
- Curator, 94–95, 97–98, 103, 105, 109–111, 171
- Death of, 39, 211 (n 88)
- Exhibition work, **80–86**, 129
- Fieldwork, 80, 82, 109, **122–130** (*127–128*), 148
- Film maker, 38
- Noble and his staff, **39–54**
- Temperament of, 39–41, 53, 214 (n 130)
- Noble, Ruth Crosby, 34, 36, 40, 80, *124*, 125–126, 129
- Novacek, Michael, 62
- Oliver, James Arthur, 56, 57, **58–60**, 94, 103
- Organ, James, 110
- Ornithology, see Department of
- Ortenburger, Arthur I., **43–44**, 45, 82, 99, 126, *128*, 152
- Osborn, Henry Fairfield, 13, 15–17, 26–27, 32, 35, 43, 50, 57, 104, 120, 141–142, 147, 161–163, 169, 223 (n 238)
- Our Small Native Animals*, 48
- Pageant of Nature, The*, 8, 117
- Palser, Irene, 168–169
- Paolillo O., Alfredo, 159
- Paraffin infiltration (see also under Herpetology Museum Exhibits), 103, 129, *131*
- Parker, Fred, 152
- Parr, Albert, 57–59
- Phelps, Kathleen de, 160
- Phelps, W. H., Jr., 157–159
- Phelps, W. H., Sr., 157
- Phipps Foundation, 159
- Pine Barrens, New Jersey, 28
- Pope, Clifford H., 24–25, 39–40, **43–44**, 46, **48–54**, 56, 60, 126, 128, **146–150** (*149*), 168, 212 (n 100)
- Pope, Mrs. C. H., see Davis, Sarah
- Pregill, Gregory, 30
- Quadrumvirate, Dickerson’s, 18, 42
- Quivira Specialties Co., 48
- Rainger, Ronald, 35, 57, 163, 223 (n 238)
- Rancho Grande (Venezuela), 112
- Reptiles of China, The*, 48–49, 52, 150
- Research Associates, 59–60
- Rondon, Cândido Mariano da Silva, **144–146** (*145*, *156*)
- Roosevelt, Kermit, 144
- Roosevelt, Theodore, **144–146** (*145*), 147
- Roze, Janis A., 159
- Rutgers University, 110
- Rüthling, Paul, 112
- Ruthven, Alexander, 7, 99, 108, 119, 123, 203 (n 3)
- Ruthven Report, 56, 203 (n 3), 214 (n 131)
- Schackelford, J. B., *149*
- Schmidt, Arthur, 39, 56
- Schmidt, Frank, 20, 27–28, 42
- Schmidt, Karl Patterson, 12, 16, **19–25** (*21*), 31–32, 34, 36, **41–42**, 43, 47–49, 53, 60, 99, 103, 105–106, 108, 119, 121–123, 126, 129, 142, 148, 152, 166–168, 207 (n 48, 51), 208 (n 55), 211–212 (n 95)
- Schram, Frederick R., 36
- Señaris, Celsa, J., 160
- Shamu, Irene Madeline, 103
- Shapiro, Harry L., 162
- Shaw, Margaret S., 103–104
- Sherwood, George H., 13, 15, 16, 47, 50, 134
- Shiras, George, 3rd, 123

- Sidamon-Eristoff, Anne, 159
Simmons, John E., 107–108
Simpson, George Gaylord, 57, 162
Sinitsin, Demetrius Theodore, *see* Tidy, Demetrius Theodore
Slevin, Joseph, 125
Slye, Maud, 74, 117, 204 (n 5)
Smithsonian Institution, 135
Snedigar, Robert, 39, **43**, **48**, 56
Society for the Study of Amphibians and Reptiles, 168
Stanford University, 95
Stefánsson, Vilhjálmur, 13, 15, 117, 147, 161
Stejneger, Leonhard, 27, 95, 108, 123
Stetzer, Esther Alice (Mrs. Langslow), 103, 172
Steyermark, Julian, 158
Stone, Charles A., 147
Sturgis, Frank K., 16, 17
Suggestions to Collectors, *see* collecting leaflets
Tags, specimen, 99–100
Tate, G.H.H., **155–157** (156)
Tate, Geoffry, 156
Taylor, Edward H., 123
Teller, Edward, 103
Tepuis, *see* Lost Worlds
Thornber, J. J., 118
Through the Brazilian Wilderness, 146
Thurber, James, 137
Tidy (aka Sinitsin), Demetrius Theodore, **43**, **45–47**, 48
Tilger, Grace, 101, 169, 172
Tobach, Ethel, 172
Toledo Zoological Society, 110
Townsend, Carol R., 160
Townsend, Charles H., 68, 74
Triumvirate, Dickerson's, 12, 18, 29, 31, 42, 167
Tropical Research Station, British Guiana, 32, 108, 112
Type specimens, 98
U.S. National Museum, 95, 102
University of Rochester, 135
Van Denburgh, John, 43
Vanzolini, Paulo E., 48, 160
Vaughan, Anne A., 167
Venezuelan National Park System, 160
Vernay, Arthur S., 162
Vertebrate Paleontology, *see* Department of
Virginia Polytechnic Institute, 110
Wadsworth, Rose, 93
Walford, Lionel A., 128
Ward's Island (Manhattan State Hospital), 16, 17
Watson, Frank Edward, 119
Wax infiltration, *see* paraffin infiltration
Wheeler, William Morton, 7, 95, 203 (n 2)
Whitney, Harry Payne, 150
Wied-Neuwied, Alexander Philipp Maximilian zu, 7
Wissler, Clark, 54, 72
Wong, James, 149
Woods and Forestry, Dept. of, 8
Works Progress Administration (WPA), 36, 39, 56, 87, 101, 168, 214–215 (n 137)
World War I (European War, Great War), 18, 22, 25, 27–29, 117
World War II, 162
WPA, *see* Works Progress Administration
Wright, Albert Hazen, 20, 24
Yearbook of Herpetology, 168
Zweifel, Richard George, 31, 48, 58, **60–63** (61), 86–90, 92–93, 102–106, 110–111, **152–154** (153), 159, 168, 181–187 (bibliography)